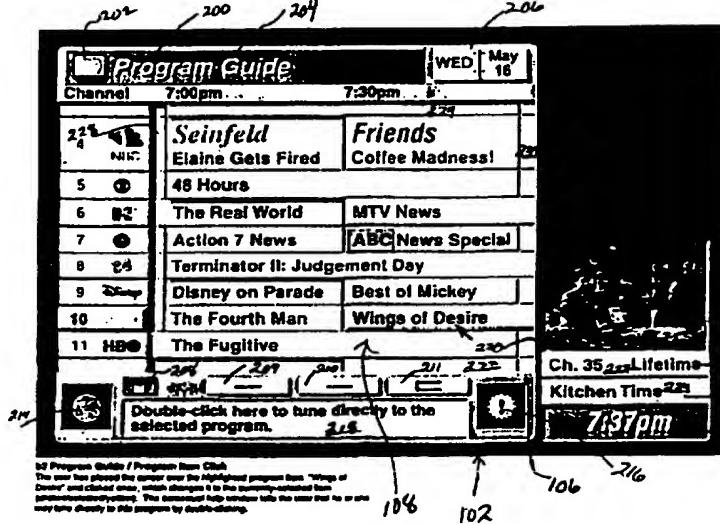




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ :		A1	(11) International Publication Number:	WO 98/06219
H04N 7/10, 7/14			(43) International Publication Date: 12 February 1998 (12.02.98)	
(21) International Application Number: PCT/US97/13751		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).		
(22) International Filing Date: 5 August 1997 (05.08.97)				
(30) Priority Data: 60/022,436 6 August 1996 (06.08.96) US 08/906,073 5 August 1997 (05.08.97) US				
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(54) Title: ELECTRONIC PROGRAM GUIDE WITH INTERACTIVE AREAS



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ELECTRONIC PROGRAM GUIDE WITH INTERACTIVE AREAS

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BACKGROUND OF THE INVENTION

The present invention generally relates to television schedule information, and more particularly to a system and method for displaying a television program guide on a television screen.

As the number of television stations in a metropolitan area or on a cable network has increased, the number of programs of potential interest that are presented to a viewer has risen dramatically. With the use of dish antennas capable of receiving direct satellite signals, the multitude of programs available to the viewer has further increased.

Additionally, television faces a digital future that will see the merger of television and PC technology. The television set of the future will include a micro-computer, a modem of interconnectivity with other computers over networks, intranets, and the internet, and be connectable to computer peripherals such as printers. Such capabilities as near "video on demand" (NVOD), "video on demand", access to the world wide web", "audio on demand", etc. will be present the viewer with a plethora of information and bandwidth.

As has become increasingly evident, information overload can actually reduce the usefulness of the information delivered. Accordingly, a great challenge exists to provide an interface that manages and provides an intelligent, user-friendly interface to the information available.

Consequently, television schedule systems that are provided directly on the viewer's television screen have been developed to assist the viewer in sorting through these various programs and determining which programs to watch or record. One such television schedule system is disclosed in commonly assigned U.S. Patent No. 5,353,121 (Young et al.).

the complete disclosure of which is hereby incorporated by reference. In one embodiment of Young, the television schedule includes a series of menu screens having an array of cells corresponding to different television programs. The 5 viewer may scroll through the cells to view which television programs are being presented on various channels at various times. In addition, the viewer may select certain cells to obtain more information on the associated program or to pull up other submenus with additional options.

10 The recent development of television schedule systems, such as the above described patent to Young, have created many new challenges. One such challenge is providing a system and method that is suitable for use on a PC, PC/TV, WebTV, or TV to manage intelligently the vast stores of 15 information available and provide user access and control directly through an electronic program guide. Another challenge is to facilitate easy access to a wide range of functionality through the combination of a limited number of user interactions.

20

SUMMARY OF THE INVENTION

The present invention provides a system and method for displaying schedule information on a visual interface, such as a television screen, a computer monitor or the like. 25 The present invention also provides a system and method for allowing the viewer to navigate and interact with a program guide that is displayed, for example, on the viewer's television screen. The program guide will usually include a schedule information area that depicts the programs that are 30 being presented on each channel at each time during the day. With an input device, such as a remote control device, pointing device, mouse, keyboard, microphone or the like, the viewer can browse through the schedule information area and/or obtain more information about programs of particular interest.

35 According to one aspect of the invention, actions are directly invoked by moving a pointer over areas of the visual interface and selecting or "clicking" on the area. A

"contextual help window" in the display area prompts the user as to what can be or needs to be done as the user moves the pointer over the display area. This feature insures that the user always knows what's going on.

5 In one aspect of the invention, a system and method is provided for allowing the viewer to utilize display action controls, configured as glyphs, to recursively vary the configuration of the display area. Each glyph is activated by a point and click action of the user input device and serves
10 as a switch for changing between two modes.

According to one aspect of the invention, an "information glyph" switches back and forth between a title-only grid/list of many items (either a grid or listing, with one item selected) and an "information expansion" of a single item (expanding to display scrollable program or item information). The information glyph provides zoom-out for an overview or zoom-in for in-depth information.

15 According to another aspect, a "find others glyph" automatically searches for and displays a listing of all other airings of a currently-selected program.

20 According to a further aspect, a "flip glyph" flips between vertical and horizontal configurations of the display area.

According to another aspect of the invention, a
25 "record glyph" allows for directly controlling recording with a single click.

According to another aspect of the invention, a World Wide Web (WWW) icon appears on the display when a link to a website associated with the currently-selected program exist. Clicking on the WWW icon connects the user's system to
30 the associated website.

According to another aspect of the invention, a linked services icon appears on the display when linked services associated with the currently-selected program are available. Clicking on the linked services icon configures the
35 user's system to access linked services.

According to another aspect of the invention, when the user moves the pointer over a video window showing a currently-tuned channel the window splits into two parts. A top part is a clickable area allowing the user to tune directly to a currently-selected program in the display area and a lower part allowing the user to return to the currently-tuned program that was being displayed before the window split.

According to another aspect of the invention, scrollable areas are highlighted when the pointer is moved into the area with arrows indicating the direction of scrolling. Areas within a display area can activate scrolling of only a portion of a display area.

According to another aspect of the invention, each action is performed by a user is confirmed in a text window to reinforce the user's confidence that the action has been performed.

According to another aspect of the invention, a display mode title area displays a current display mode icon and text description when not selected and displays alternative selectable display mode icons when activated.

According to another aspect of the invention, a browsing window may be activated when a program is being viewed which may display the record glyph and world and linked-services icons.

Other features and advantages of the invention will be apparent in view of the following detailed description and the appended drawings.

30 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a representation of an embodiment of the EPG display of the present invention;

Fig. 2 is a block diagram of a TV system;

35 Fig. 3 is a block diagram of a hardware unit for generating an on-screen electronic programming guide (EPG);

Fig. 4 is a schematic diagram of the hierarchical database utilized to generate the EPG;

Figs. 5A-5D are schematic diagrams of data structures in the database;

Fig. 6 is a schematic diagram depicting the transmission of an EPG in a digital satellite system;

5 Figs. 7-10 are representations of displays that implement the scrolling function;

Figs. 11-14 are representations of displays that implement the find information function;

10 Figs. 15-17 are representations of displays that implement the find others function;

Figs. 18-19 are representations of displays that implement the vertical/horizontal flip functions;

Figs. 20-25 are representations of displays that implement the record function;

15 Fig. 26 is a representation of a display that implements the tuning function for the video window;

Figs. 27A-27H are representations of displays for implementing a transitional animation function;

20 Figs. 28 and 29 are representations of displays showing the interactive program mode area and icons; and

Figs. 30-33 are representations of displays for interacting with the news services feature.

DESCRIPTION OF THE SPECIFIC EMBODIMENTS

OVERVIEW OF THE INTERACTIVE SCREEN

The present invention provides a schedule system and method for displaying schedule information on a visual interface, such as a television screen, computer monitor or the like. The system and method is particularly useful for use with television schedule information. The television schedule information is presented in a program guide having a schedule information area depicting the program that are being shown on each channel for a period of time, e.g., a day, week or longer.

35 The television schedule system includes an input device, such as a remote control device, pointing device, mouse, keyboard, microphone or the like, to allow the user to

browse through the schedule information area and/or obtain more information about programs of particular interest.

The controller may comprise a trackball, cursor controller, pointing device, a microphone for allowing voice activation, a number of keys or buttons that function to move the viewer around the screen, or the like. In the preferred embodiment, the controller comprises a scrolling mechanism for displacing a movable cursor through a matrix of cells or windows on the screen. The cursor may comprise a physical icon on the screen, or it may be represented by highlighting or other visual indications of the cells or windows that are scrolled through by the viewer.

Figure 1 illustrates a program guide 102 for the television schedule system of the present invention. The program guide 102, which is the primary mode in the television schedule system, includes a number of screen information areas or windows in a particular screen where the viewer operates an input device, such as a pointer device described above, to move around vertically and horizontally and to interact with that screen area's function. Preferably, the currently active screen area will be indicated to the viewer, for example, by changing the background color from a light greyscale metallic to a brighter, active color. Within each screen area are one or more items, typically arranged in a matrix or grid so that the viewer can scroll through the grid. The items can be selected or activated with the input device.

As shown in Fig. 1, program guide 102 preferably includes a schedule information area 106 having a program matrix 108 of cells or items that depict the shows that are being presented on each channel at each time during the day. Program guide 102 conveniently lists the channels in a vertical column to the left of the program matrix 108 and the times in a horizontal row above matrix 108. The viewer selects an area by moving a pointer 110 over the area associated with a desired action. When the pointer 110 is moved over an area, the item may be automatically highlighted with a brighter color to indicate the viewer's location.

In Fig. 1, program guide 102 includes a number of other information areas. For example, program guide 102 includes a display title area 200 that includes a display mode icon 202 and a display mode description text field 204. An 5 interactive data control window 206 displays the date for the listings in display matrix 108.

Directly below the display area 108 are four small action controls 208-211 which give the viewer the ability to recursively vary the configuration of the display area 108. 10 The operation and functions of these action controls is described in detail below. A world icon 214 may appear below the display area on the left side and a star (linked services available) icon 216 may appear directly below the display area on the right side. The operation and functions of the world 15 star icons are described in detail below.

A contextual help window 218 is located at the bottom of the program guide 102 and displays a text field that informs the user of actions that can or need to be done when the pointer is located in a particular area of the program 20 guide. Many examples of the different text fields that appear in the contextual help window 218 are described below.

A video window 220 may display a currently-tuned television show. Below the video window 220 is a channel window 222, a title window 224, and a current time display window 226. Each of these windows are interactive as 25 described below.

OVERVIEW AN EPG SYSTEM

In a preferred embodiment, the electronic program 30 guide of invention may be implemented either on a personal computer, a PCTV, a television connected to a set-top box, or a television including a custom board. However, the invention is not limited to any particular hardware configuration and will have increased utility as new combinations of computers 35 and television systems are developed. In the following any of the above will sometimes be referred to as a "TV system". Block diagrams of representative TV systems are depicted in

Fig. 2. Details of implementation are not depicted because the invention is not limited to any particular TV system.

As is well known, the picture to be displayed may be transmitted as an analog signal, for example according to the 5 NTSC standard utilized in the United States, or as a digital signal modulated onto an analog carrier. The signals may be received over a cable, or via an antenna or satellite dish. Typically, television sets are designed to receive analog 10 signals and computers display devices are designed to display pictures encoded in a digital format. However, decoder system converts the digital data to an analog signal for display on a television set and TV modems can format analog TV signals for display on a monitor.

In Fig. 2, analog or digital TV signals, received 15 via cable 30, antenna 32, or satellite dish 34, are provided to a television system. If the signal is from a digital broadcast service, then a decoder 36 converts the signal to baseband video and audio or channel 3/4 RF. If the signal is an analog signal it is passed through as a video output. The 20 television system 38, depending on its configuration, receives selected ones of the outputs and displays the received program.

A PCTV includes a TV card 40, connected to either live video, baseband video, or channel 3/4 output, digitizes 25 the video image and displays the video image in a resizable window on the computer monitor. The PCTV is also coupled to land telephone lines by a modem 42.

If the received signal is an analog TV signal the TV 30 card of the PCTV digitizes the analog signal and extracts included information from the vertical blanking intervals. On the other hand, if the signal is a digital signal separate 35 audio, video, VBI (vertical blanking information such as closed caption, teletext, and program related information), program guide, and conditional access information are provided as separate bitstreams. The video and audio bitstreams for programs are converted to a format for display and the program guide information is processed to form program guide database.

The processor, executing software stored in memory, generates interactive electronic program guide images and images of received programs. The guide can be used to interact with and control programs displayed in the window.

5 A television system configured to display an electronic program guide such as a guide provided by StarSight telecast includes an on-screen display controller and other hardware described below. If a standard analog broadcast signal is received program guide data is extracted from the 10 VBI by a VBI data slicer and processed to form a program database. If a DBS digital signal is received, either from a satellite or cable, VBI and program data are provided in separate bit streams. The program guide images are generated are either generated locally or remotely and provided to an on 15 screen display controller. Interactivity is provided via a remote control.

Alternatively, the program guide can be displayed on a computer monitor that interactively controls the television set through, for example, an IR interface including an IR 20 blaster 44 to generate IR codes to control the television and/or a VCR.

If the electronic guide database is generated 25 locally the system for creating the electronic programming guide must receive television schedule information and process the received information to create a database. Thus, the system requires, a data reception unit, a processor, memory to store program code and a database, an on-screen display generator (OSD), and a control interface for tuning to selected channels.

30 In one preferred embodiment, the schedule information is transmitted as a set of short commands of specified formats. Different commands communicate information such as a show schedule for a given channel, the title of each show in the schedule, descriptions and information attributes about each show in the channel. Thus, information for a show 35 to be broadcast at a particular time is transmitted in several commands. ID numbers in the commands facilitate organizing

the information into a relational database utilizing database engine (DBE) software stored in memory and executed by the processor.

In a preferred embodiment, a board is included at a viewer's television set and the database is stored locally and commands are transmitted in the VBIs of programming on a designated channel, for example PBS. An example of a board for receiving program guide information, generating program guide database, displaying the program guide, and interactively controlling the program guide is depicted in Fig. 3. The commands are transmitted to the board in the vertical blanking intervals of programming broadcast on a designated channel.

Alternatively, the commands could be transmitted to the local unit over land telephone lines. Additionally, as described below, in some systems the database is built remotely and the guide itself is transmitted to the local unit.

The database engine builds a hierarchical database in the RAM. The hierarchical structure of the database is depicted in Fig. 4. The database is structured internally as schedule data structures and theme data structures linked by handles and handle tables. Each handle is an index to a handle table which contains pointers to blocks of memory where items of the database are stored.

In another embodiment, for example a DSS system, program guide data is transmitted as a bit stream that is processed by the database engine.

Additionally, a N.E.W.S. (news, entertainment, weather, and sports) database has been developed. Commands including story text and story IDs are transmitted. Links from the program guide to stories related to a program can be created and the related stories can be accessed from the guide.

An advertisement database is also created from commands including advertising text and logos including IDs for linking the ads to shows displayed in the EPG. The user

may access the advertising information directly from the guide.

An internet database is also created from commands including URLs to internet sites related to programs displayed on the EPG. If the viewer is viewing the EPG on a platform that is Web enabled, e.g., WebTV, a PC, or PCTV, then a linked site can be accessed directly from the EPG.

Additionally, a graphics program module builds various displays utilizing schedule, show title, and other information from the database. If the OSD controller operates in the character mode the display is a grid of character codes which are transferred to the OSD controller which generates the on-screen display.

An input-response user interface program module responds to user input to generate new displays responsive to the particular input. In one preferred embodiment, the user utilizes an input device, e.g., a remote control, mouse, or keyboard, to place a pointer over a part of the current display and clicks. The input-response module responds to the position of the pointer and the particular display currently displayed to generate a responsive display or take a particular action. In another preferred embodiment the user interface responds to function buttons on a remote control. Specific examples will be described below.

25

DETAILED DESCRIPTION OF THE EPG SYSTEM

BOARD DESCRIPTION

Fig. 3 is a block diagram an embodiment of the electronic hardware unit 52 utilized to perform the electronic on-screen schedule display and other functions. The particular hardware unit 52 depicted is for TVRO (TV Receive Only) customers having home satellite dishes for television viewing. This unit is coupled in series with existing customer TVRO equipment.

In Fig. 3, the unit receives Baseband Video in 123 from the customer TVRO system. The unit optionally outputs

Baseband Video out 128 or channel 3/4 RF out 130. The unit includes an 8-bit microprocessor 100, 64 bytes of code ROM 101, 512 K of RAM 102 for program data storage, a custom gate array 103, segmented base registers 104 for fast memory data manipulation, security logic 106 for decoding incoming encrypted data, a serial bus 108 for display controller interface, serial bus 110 for inter-processor communication, watchdog timer 112 for error recovery, IR input 113, IR transmitter circuits 116 for TV, VCR control, IR output 117, CRC-32 encoding and decoding logic 118, on-board power supply 120, video input 123, On-Screen Display Controller and Formatter 124, custom color converter 126, RF modulator 127, choice of Baseband Video or RF outputs 128 or 130.

The on-screen display controller and formatter (OSDCF) 124 functions as an I/O controller, an on-screen display controller (OSD), and also as a closed-caption data (CCD) VBI data slicer. The VBI (vertical blanking interval) is a dead space in a TV signal that allows a television signal to reposition the scanning electron beam from the bottom to the top of the screen. Digital data, for example close-captioned data, is modulated onto the carrier signal during the VBI.

The OSDCF 124 includes an analog to digital convertor (ADC) which digitizes the incoming baseband video and extracts digital information transmitted in the VBIs. As explained more fully below, messages for transmission to the database are transmitted in the VBIs. These messages are transferred to the processor 100 which executes a data base engine process to build or update the database.

The OSD part of the OSDCF 124 includes cache memory, character memory, timing functions, and an external RAM. The OSD reads high level graphic commands sent from the processor 100 and stores graphic information in the RAM. The OSD outputs red (R), green (G), blue (B), graphic data which is used to generate a local video signal. Depending on the state of the user input interface, described below, the OSD local video output or the incoming live video will be displayed.

Accordingly, screen display graphic data generated by the database engine is transferred to the RAM of the OSD which generates a local video signal that causes the display screen to be displayed on the television screen.

5

SCHEDULING DATA STRUCTURES

The DBE builds a hierarchical database in the RAM. The hierarchical structure of the database is depicted in Fig. 4. The database is structured internally as schedule data structures and theme data structures linked by handles and handle tables. Each handle is an index to a handle table which contains pointers to blocks of memory where structures of the database are stored.

The hierarchy for the schedule data structures, in descending order, is:

Channel Data Table: contains subscriber unit's list of channels;

Show List: contains time slots for each show scheduled to be broadcast for a channel;

Show Title: contains the title text and show title attributes;

Show Description: contains show's ratings, attributes, and description text.

A channel data table, depicted in Fig. 5A, is the highest data structure in the hierarchy. This table includes an entry for each channel received by the subscriber unit. The entries in the channel data table are changed infrequently and are determined by the location of the subscriber unit and type of services received. Each channel data table entry includes information concerning the channel and a handle to a show list handle table for the channel.

The next data structure in the hierarchy is the show list depicted in Fig. 5B. The show list includes a start time typically being midnight GMT and 24 hours of scheduling. The

channel's schedule is given by an ordered sequence of show slots, with a show slot for each show to be broadcast by a particular channel for a particular day. Each slot includes a duration, show title handle, and show description handle.

5 Finding an entry corresponding to a given start time requires the entries to be scanned, in order, from the beginning of show list and adding duration values.

The database, when fully constructed, holds a weeks worth of show lists for each channel. The days of the week 10 are accessed by incrementing the show list handle by two bytes. The show lists are updated each day at midnight GMT with the show list for the day just completed being deleted and the show list for same day next week being added to the database.

15 The next data structures in the schedule hierarchy are the show title entries, depicted in Fig. 5C and show description entries, depicted in Fig. 5D. For a given show slot the show title entry and show description entry are accessed utilizing the handles included in the slot. The show 20 title and show description entries are stored in a memory pool divided into blocks. Each show title is identified by a unique 20-bit show identification number (SID) and each show description is identified by a unique 20-bit number assigned at the head end. The show title handles are based on the SID 25 and the show title handles are offsets into a show title handle table. The entry in the show title table accessed by a particular show title handle includes the address of the first block in the memory pool where the show title entry is stored. Similarly, the show description handle table entry accessed by 30 a show description handle stores the address of the first block in the memory pool where the show description entry is stored.

Each show title entry includes theme index ID and the text of the show title. Typically, a single show title 35 entry will be referenced by many show lists for different channels, days, and times. Thus, by utilizing handles in the show lists all show lists reference a single show title entry

in memory so that memory is efficiently used. Many show title entries have a long life because the show titles may be for series that are broadcast over long periods of time and may be referenced by many showlists since many shows are broadcast by multiple channels.

5 Each show description entry includes a theme index ID, critics rating, MPAA rating for the show, traits mask bits, year produced, and show description text. Show description entries tend to have a shorter life than show
10 title entries because a description is only valid for a particular episode of a series.

SCHEDULE SEARCH

15 To obtain schedule information for a particular time and to display the schedule information in the programming grid requires the following steps. For each channel in the channel list, the show list for the day is accessed and scanned. Horizontal blocks for the channel are sized according to the duration of the show slots including and
20 following the selected time. The show title entry referenced by each show slot is accessed and the show title is displayed in the horizontal block corresponding to the show slot.

FAVORITE CHANNEL LISTS

25 Referring back to Fig. 5A, every entry in the channel data table includes a FAVORITES LINK field. This field includes a link to a next favorite channel and is utilized to form an ordered, linked list of channels in an order determined by the user.

30 The user interface and database engine provide screens to facilitate the ordering and selection of channels to be displayed in the guide. A link to the first channel in an ordered channel list is stored in memory. This link is utilized to access the channel table entry for the most
35 favorite channel. The FAVORITE LINK in that channel is accessed and utilized to access the channel table entry for the next favorite channel and so on until a designated

delimiter value, e.g., 0x00, indicates the end of the favorite channel list.

The capability of having more than one favorites list can be supported by having multiple FAVORITE LINK fields stored in each channel table entry.

AD DATA STRUCTURES

An ad list data structure is similar to the show list. It includes a start time and 24 hours of ad scheduling. The ad list is regionalized and includes an ad slot for each ad to be broadcast for a given day. The ad slot includes a duration and an Ad ID utilized to access an ad entry.

Each ad entry includes an ad banner text field, an ad text field, and a pointer to an ad logo, if appropriate. The ad logo includes a graphics file to be displayed with the ad.

The ad entries include the ad banner text, ad text,

HELP WINDOW DATA STRUCTURE

The database also includes a help string list storing ASCII help strings to be displayed in the contextual help window 218. Each help string in the list is associated with an interactive area of the EPG display. When the viewer moves the pointer over an interactive area the user interface generates a new screen displaying the associated help string displayed in the contextual help window 218.

BUILDING THE DATABASE

The data base is built by a data base engine software module operating on the processor. Messages comprising discrete commands are received by the database engine. Examples of commands include a Region Command which specifies channels available for a particular subscriber unit to be included in the Channel Data Table; a Channel Data command including information utilized to form the entries in the Channel Data Table; and Showlist, Show Title, and Show Description commands including SIDs and DIDs referencing areas in memory. The database engine selects only Showlist Commands

relevant to channels included in the Channel Table for further processing.

The data base engine creates storage locations in memory for all SIDs and DIDs included in any Showlist.

5 Information included in commands having matching SIDs or DIDs is written to the referenced memory area. In practice the SIDs and DIDs are processed by a hashing system for more efficient searching.

10 The messages may be transmitted to a subscriber unit in various ways. A system for receiving messages in the VBIs of broadcast programming has been described above. In a DBS system the messages may be transmitted in a dedicated bit stream.

15 In a DBS system video baseband signals are digitized, compressed, and modulated onto an analog carrier signals. Because of advances in the art of compression, a carrier once used to transmit a single program can now transmit four programs. Typically, in addition to video signals other bitstreams encoding information such as audio, 20 VBI (vertical blanking information data such as closed caption and teletext), program guide information, and conditional access information are provided as separate bitstreams, multiplexed into a composite bit stream, and modulated onto a carrier signal.

25 Alternatively, the database itself may be transmitted in a digital data stream. For example, in DSS the program guide information is transmitted in block of 3 hours of programming for 36 channels. Programming is digitally modulated onto different bands. As depicted in Fig. 6, a 30 satellite has several transponders 500 simultaneously transmitting on different bands. Several channels can be modulated onto a single band utilizing digital compression techniques. A bit stream including the current programming is carried by all bands. However, future programming for 35 different blocks of channels is transmitted on different bands. The blocks are transmitted in as a carousel or endless

loop so that there may be a delay before a particular time band is received.

A decoder at the viewers location receives 16 carriers and controls a tuner/demodulator to select one carrier. The carrier is sampled, decoded, error-corrected, and demultiplexed to separate the various bit streams. The decoder includes video decoder chips decompress compressed video to reconstruct pictures of virtually any size.

When the viewer accesses the guide the block for that time period is loaded into memory so that the user can interact with the guide. For a future time and different channel there may be a time delay. For example, if the current programming block were B1 and the block currently received is B4 the user must wait for blocks B5, B6, and B7, to be transmitted before the current programming can be received and displayed. The viewer would wait for a time delay equal to the sum of time durations for transmitting each block, i.e., $d_5+d_6+d_7$. If the program guide block is modulated onto a different band the cable box must tune to the band and wait until the desired block is transmitted on the carousel. So if the guide is accessed for future programming there could be a delay.

For cable the database is built at the SST head end and sent over land-lines to the cable head end. Cable company sends data anyway it wants, VBIs, satellite, digital, etc.

USER INTERFACE

The user interface takes remote control commands as its primary input. In one embodiment a user requests various functions by pressing function buttons on a remote control. In another embodiment, the GUI is utilized with different interactive regions on a displayed screen corresponding to different functions. The user moves the cursor over the interactive region corresponding to a desired function and selects the function to generate command. The particular form of entering a command is not critical and technology for utilizing voice commands may soon be available.

The user interface receives commands and responds with a requested display screen and by performing the function requested by the command. The function performed may be to perform an action such as recording a program, tuning to a channel, accessing a related internet site, purchasing a pay-per-view program, or purchasing merchandise. The data and format of each screen is dependent on the previous screen, time of day, the contents of the data base, the command received, and other parameters. A state table is used to define the screen flow.

For every defined screen, there is an entrance function, an exit function, an update function, and an array of request-handling functions. The entrance function is called when a state is first entered to collect all necessary data and format the screen. The exit function is called to release memory and data for the screen. The update function is called once per minute to update the screen time and to redraw the screen if any information displayed on the screen needs to be updated.

Once in a particular state, the table contains a reference to another software function corresponding to each key on the remote control or to each interactive region on the screen. These referenced functions will be executed whenever an associated remote control button is pressed or interactive region is selected.

For example, if the user wishes to record a program, in the GUI embodiment, the viewer moves the cursor over the record interactive region which is then selected to request that the recording function be performed. A confirmation screen will then be generated. Once the user confirms the recording request, an entry is made in a recording queue. A record daemon is then called from the real-time executive to examine the queue and manage recording functions.

The screens are displayed by the on-screen display (OSD) controller based on graphic display commands issued by the database engine. Among the primitive commands need to draw system display screens are the Erase Screen Command; Draw

Rectangle Command; Save Rectangle Command; Restore Rectangle Command; Move Rectangle Commands; Write ASCII String Command; and Draw Channel Icon Command.

Each screen includes areas that are constant and based on code and data stored in non-volatile memory and variable areas such as show titles and descriptions which utilize data stored in the database. As described above in the description of the database engine, the database is structured to facilitate efficient searching for information, generally in the form of ASCII text strings, stored in the database. Additionally, graphics files are also being stored in the database to be displayed in windows of the display screen.

15

DETAILED DESCRIPTION OF PROGRAM GUIDE

DESCRIPTION OF THE SCROLLING FUNCTION

Scrolling areas 228-232 allow for scrolling the contents of the display area in any direction. The operation 20 of the scrolling areas 228-232 is described below.

Referring to Fig. 7, when the user moves the pointer over the scroll right zone 230 the zone highlights in bright green with arrows indicating the scrolling direction. The text displayed in the contextual help window 218 informs the 25 user that clicking will scroll the display to the right to display later programs. Each click scrolls the display one half-hour. A click-and-hold scrolls a half-hour every half-second, accelerating over time as the user continues to hold, coming to a stop upon letting up.

Figs. 8, 9, and 10 depict scroll up, scroll left, and scroll down operations respectively. For the scroll up and scroll down operations each click displays the next complete vertical screen. A click-and-hold displays a new vertical screen every half-second, accelerating over time.

The operation and functions of the various action controls 208-211 will now be described.

DESCRIPTION OF INFORMATION GLYPH

Referring to Fig. 11, after selecting an item in the program display, when a user moves the pointer from the currently selected program and places the pointer over the information glyph 209 the glyph immediately splits into a two part recursive control button. The left button 209a symbolically suggest zooming-back on the selected item to obtain necessary information included in a cell and right button 209b symbolically suggests zooming-in on a particular item to see in depth information concerning a selected program. Note that the text in the contextual help window 218 tells the user what action to take and the results of the action.

Referring to Fig. 12, as soon as the user completes the click on the zoom-in glyph 209b, a transitional animation (described below) occurs and the currently selected program item moves to a top window 209c and information about that program stretches downward in a central window 209d. The user interface directs the database engine to display program description text in the central window 209d. Both elements stretch horizontally to occupy the entire display area leaving only scroll zones around the periphery. The user may now scroll around the guide in the same manner as described above. The text in the contextual help window 218 informs the user that double clicking in the area where the pointer is located will tune directly to the program.

Referring to Fig. 13, when the user moves the pointer over the text area the text in the contextual help window informs the user that clicking in this area scrolls down the text. An information scroll indication zone at the left of the text displays a highlighted area in which tow arrows point downward in the direction of scrolling.

Referring to Fig. 14, the user has moved the pointer over the information glyph 209 which again splits showing the two different zoom configurations. The currently selected button 209b is highlighted. The pointer is over the left

button 209a and the text in the contextual help window 218 informs the user that a click will access the program guide.

DESCRIPTION OF FIND OTHERS GLYPH

5 Referring to Fig. 15, after selecting a program, when the user moves the pointer over the find others glyph 210 the glyph immediately splits into a two part recursive control button. The left button 210a symbolically suggests the selected program included in program display and right button 10 210b symbolically suggests a multiple listing of the selected program. Note that the text in the contextual help window 218 informs the tells the user what action to take and the results of the action.

15 Referring to Fig. 16, after clicking on the multiple-listing glyph 210b the system displays a listing of all occurrences of the selected program in chronological order. The currently selected program is automatically selected. If the currently selected program had been for a date in the future it would appear in the middle of the list 20 with programs occurring previously listed above it. Note that the text in the contextual help window informs the user that double-clicking will tune directly to this program.

25 Referring to Fig. 17, the user has moved the pointer over the find others glyph 210 which again splits showing the two different display configurations. The pointer is over the left button 210a and the currently selected button is highlighted. The text in the contextual help window 219 informs the user that a click will display the selected program in the program display grid.

30

DESCRIPTION OF VERTICAL FLIP GLYPH

Referring to Fig. 18, when the user moves the pointer form the currently selected program and places it over the vertical flip glyph 211 the glyph immediately splits into 35 a tow part recursive control button. The left button 211a symbolically suggests a horizontal display pattern and the left button 211b symbolically suggests a vertical display

pattern. Note that the text in the contextual help window 218 tells the user what action to take and the results of the action.

Referring to Fig. 19, as soon as the user completes
5 the click a transitional animation (described below) occurs
and the display area rotates clockwise so that the current
channel item is stretched across the top with the programs
that were laid out horizontally before now listed vertically
10 below it. The text in the contextual help window 218 informs
the user that double clicking in the area where the pointer is
located will tune directly to the program. All the action
control buttons 208-211 are displayed and are functional.

DESCRIPTION OF RECORD GLYPH

Referring to Fig. 20, when a user moves the pointer
15 from the currently selected program and places the pointer
over the recording glyph 208 the glyp is highlighted and the
text in the contextual help window 218 tells the user what
action to take and the results of the action.

Referring to Fig. 21, when the user clicks on the
recording glyph 208 an action menu appears. In the Figure,
20 the pointer is placed over the "Record once..." entry which is
highlighted. The text in the contextual help window 218 tells
the user that clicking will record the program once. This is
25 the only option that appears because record once is the only
frequency available for this program. For other programs it
may be appropriate to display "Record Daily", "Record Weekly",
"Record entire miniseries...", etc. The numbers that appear
in the items are key-entry equivalents. For this reason,
30 direct, keypad-entered tuning is disabled during functional
sequences such as recording.

Referring to Fig. 22, when the user has clicked on
the "Record once..." item a confirmation window 300 opens with
35 text explaining the action about to be taken and with pointer
placed over an "Okay" item which is highlighted. If the user
clicks then the action described in the confirmation window
will be completed. A "Cancel/Go Back" item is also displayed.

If the user clicks here then the action described in the confirmation window 300 is not completed and the display returns to the form depicted in Fig. 23. Note that the function of the "Okay" item is described by the text displayed in contextual help window 218.

Note that the other display action controls have disappeared because the actions invoked by those controls are not appropriate in this context.

As depicted in Fig. 23, when the user returns from the recording scheduling sequence, a tape symbol 302 has been added to the program item. This symbol will appear on all instances of this program item wherever displayed as long as it is valid.

Referring to Fig. 24, a selected program displays the tape symbol as the user places the pointer over the recording glyph 208. Note that the text in the contextual help window 218 informs the user that the selected program's recording settings may be edited.

In Fig. 25, only those action items appropriate to the selected program, in this example "Remove this program from the recording list...", are displayed. In other cases, such a program with multiple recording frequencies, the remaining settings would be accessible at this point, allowing the user additional changing options in addition to removing the program from the recording list. The item "Cancel/Go Back" item always appears.

The video window 220 can be used for all types of promotional, descriptive, or contextual video or graphics, such as a short preview of the show that is currently being highlighted in show matrix 106. The video window 220 is also interactional similar to the other areas of guide 102.

In an exemplary configuration, the video window 220 displays the currently tuned program "live" so that the viewer can browse through program matrix 106 without missing the action on the currently tuned program. This feature allows the viewer, for example, to keep track of the score of a football game while browsing through the program matrix or

5 performing other interactions with the system, such as purchasing goods or services, searching for more information on a program, etc. In another configuration, the viewer may set the video window to change as the viewer browses through program matrix 106 so that the video window 220 depicts the highlighted program in the matrix. This allows the television viewer to quickly view each program without exiting from the program guide 102.

10 Referring to Fig. 26, the user has selected a program in the guide, i.e., Wings of Desire, and placed the pointer over the video window 220. The video window is split into two interactive areas 220a and 220b. The top window 220a may be clicked to tune to the program selected in the guide or the bottom window 220b may be clicked to return to the 15 currently-tuned program. The contextual help window 218 provides text to explain this split video window function.

20 A transitional animation storyboard for the flip transition from the horizontal to vertical display. As is well-known computer animation is achieved by displaying a series of images which differ by a small amount. By 25 transitioningly animating the changing of the displays the viewer becomes more comfortable and familiar with the functional of the EPG.

25 INTERACTIVITY OF THE DISPLAY MODE TITLE AREA

Fig. 28 illustrates that when the pointer is moved over the display title area 200 the display title area becomes an area of selectable icons 202a-d. The message in the contextual help window 218 indicates that the program guide is the current display mode. In Fig. 29 the pointer has moved over the Electronic News Service Icon 202b.

FUNCTION OF ELECTRONIC NEWS SERVICE ICON

In Fig. 30, when the NEWS service icon 202b is selected a transition animation occurs and changes the display to a list of categorical choices. In Fig. 31, when the pointer is moved over the "1 Latebreaking News..." category

the help text indicates the function to be performed by selecting this category. In Fig. 32, a list of latebreaking news items is displayed when the "Latebreaking News..." category is selected. In Fig. 33, just as in other contexts, 5 the headline story is expanded into scrollable text. Note also that the info glyph has expanded into its recursive state.

The database includes a title table of story titles each including a pointer to an entry in a story description 10 list including the detailed text of the story. The user interface responds to selection of interactive areas to display the story titles and descriptions when associated area are selected by the viewer.

WHAT IS CLAIMED IS:

1 1. A system for directly invoking actions from
2 interactive areas of an EPG displayed on a screen comprising:
3 an EPG display controller that processes display
4 data to display an EPG display, and including interactive
5 areas and a contextual help window, and displaying a
6 pointer/cursor on the screen, with the interactive areas
7 configured to invoke EPG actions, associated with interactive
8 areas, when the interactive areas are selected by a viewer;

9 a memory for storing an EPG database containing
10 display data, where said display data includes contextual help
11 text associated with each interactive area, and program data;
12 an input module that receives user pointer/cursor
13 movement commands;

14 a processor, coupled to the memory, the input
15 module, and the EPG display controller, with processor
16 configured to process:

17 database engine program data to
18 execute a database engine that generates EPG
19 screen data, access contextual help test,
20 performs searches of said database to generate
21 same program and same channel show lists;

22 user interface program data to
23 execute a user interface that user
24 pointer/cursor movement commands, and generates
25 response screens, with the user interface
26 responsive to movement of the pointer/cursor
27 over an interactive area to display contextual
28 help text in the contextual help window
29 explaining the action to be invoked by
30 selecting the interactive area and user
31 interface responsive to the selection of an
32 interactive area displayed on the screen to
33 cause the database engine to generate response
34 data for a reconfigured display associated with
35 an active area, and for providing the
36 reconfigured display data to the EPG display

controller so that a reconfigured display is displayed on the screen.

1 2. The system of claim 1 where said display data
2 includes data for causing said EPG display controller to
3 display an EPG display including interactive areas in the
4 forms of glyphs and where said program data includes data for
5 causing said user interface to recursively vary the
6 configuration of the EPG display when the viewer activates the
7 glyphs.

1 3. The system of claim 2 wherein a first glyph is a
2 find glyph which splits into find-others and display-guide
3 glyphs when activated, with said user interface for generating
4 display data listing all programs for a selected channel when
5 said find-others glyph is activated and for generating a grid
6 of channels and programs when said display-guide glyph is
7 activated.

1 4. The system of claim 2 wherein a second glyph is
2 a find-others-airings glyph which splits into currently-
3 selected and find-others glyphs when selected, with said user
4 interface for generating display data listing all other
5 airings for a selected program when said find-others glyph is
6 activated and for generating a grid of channels and programs
7 when said currently-selected glyph is activated.

1 5. The system of claim 2 wherein a third glyph is a
2 flip glyph which splits into horizontal and vertical glyphs
3 when selected, with said user interface for generating display
4 data vertically listing all programs for a selected channel
5 when said vertical glyph is activated and for horizontally
6 listing all programs for a selected channel when horizontal
7 glyph is activated.

1 6. The system of claim 2 wherein a first glyph is a
2 zoom glyph which splits into zoom-out and zoom-in glyphs when
3 activated, with said user interface for generating display
4 data showing detailed program information for a selected
5 channel when said zoom-in glyph is activated and for
6 generating a grid of channels and programs when said zoom-out
7 glyph is activated.

1 7. The system of claim 1 with said EPG display
2 controller for displaying a selected video signal in an
3 interactive video window on said screen which splits into
4 select currently-tuned and select currently-selected channel
5 video interactive areas when said pointer/cursor is positioned
6 over said interactive video window;

7 with said program data including video signal
8 selection program data;

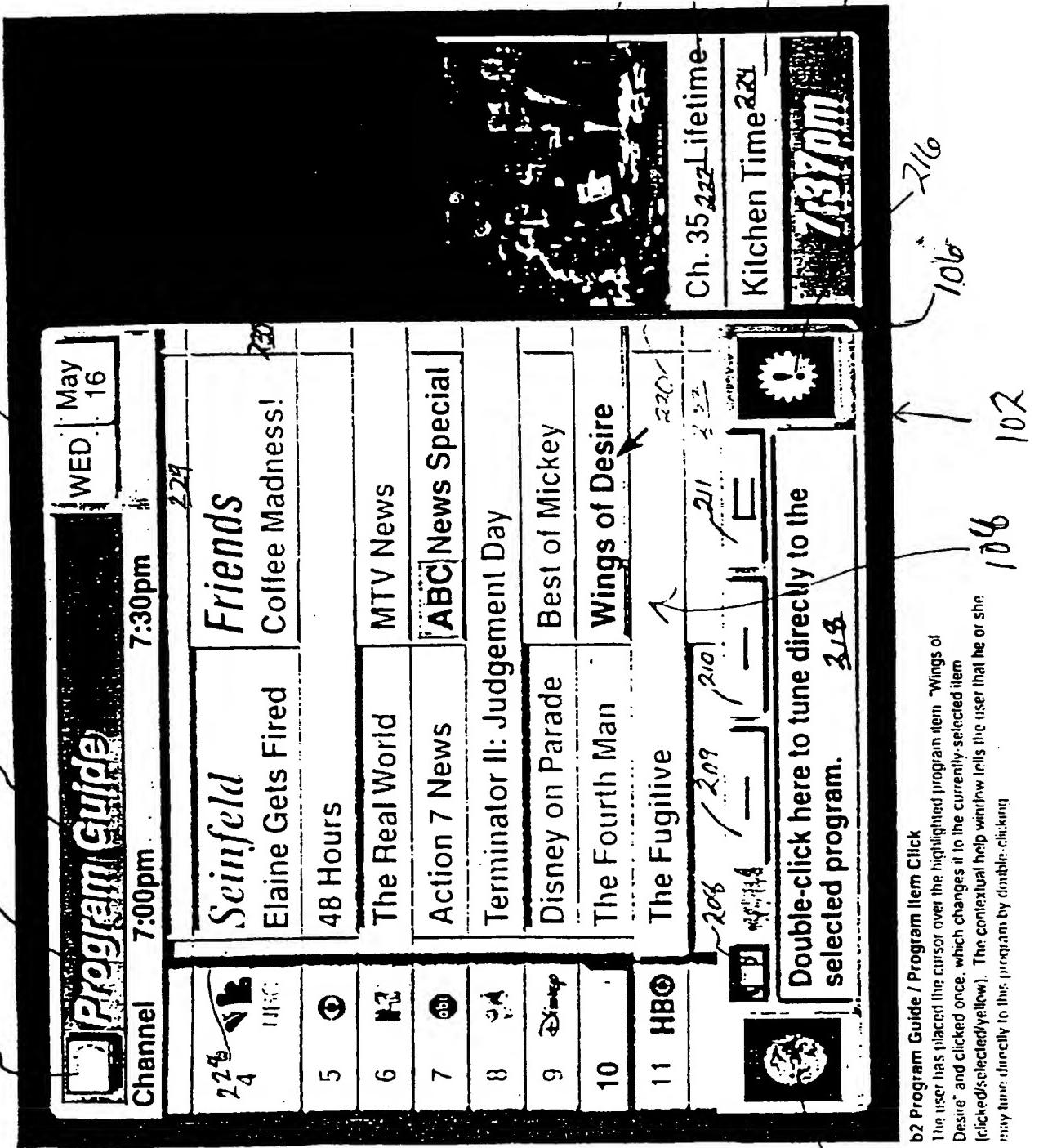
9 with said processor configured to process said video
10 selection data to display a currently-tuned channel in said
11 interactive video window when said currently-tuned interactive
12 area is selected or to display a currently-selected channel in
13 said video window when said currently-selected active area is
14 selected.

1 8. The system of claim 1 wherein said program data
2 includes data for causing said EPG display controller to
3 display an EPG display including an interactive title mode
4 area and where said program data includes data for causing
5 selectable display controlling icons to be displayed in said
6 interactive title mode display area when said pointer/cursor
7 is positioned over said interactive title mode area.

1 9. The system of claim 8 wherein a first display
2 controlling icon is a program guide icon that, when selected,
3 causes the user interface to display a program guide display.

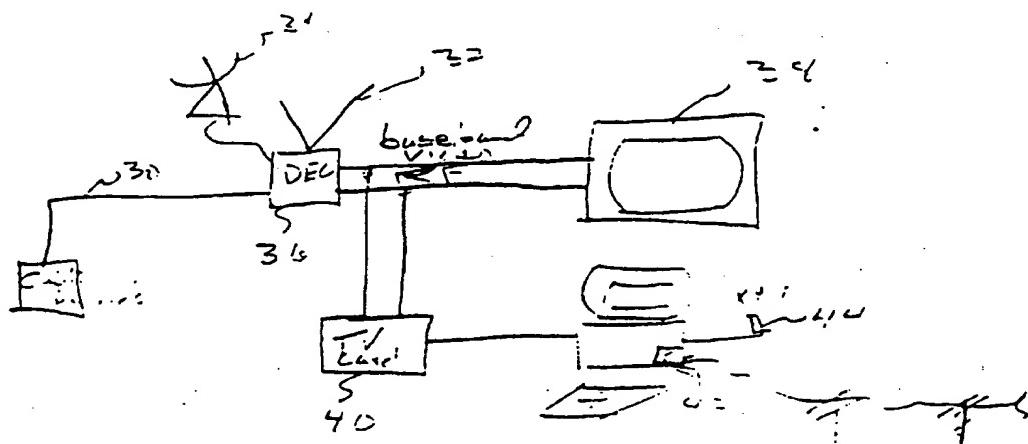
1 10. The system of claim 8 wherein a second display
2 controlling icon is a news services icon which, when selected,
3 causes the user interface to display a list of new services.

1 / 35



b2 Program Guide / Program Item Click
The user has placed his cursor over the highlighted program item "Wings of Desire" and clicked once, which changes it to the currently selected item (clicked/selected/yellow). The contextual help window tells the user that he or she may tune directly to this program by double clicking.

2/35



3/35

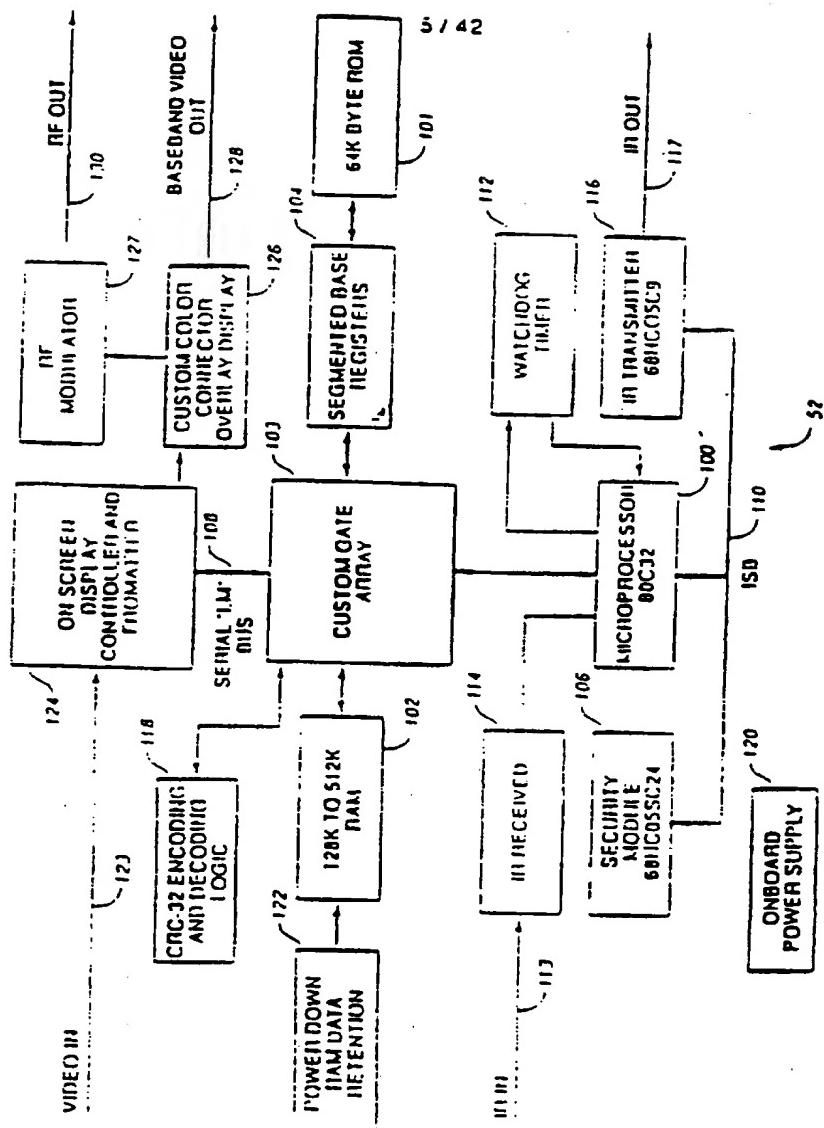
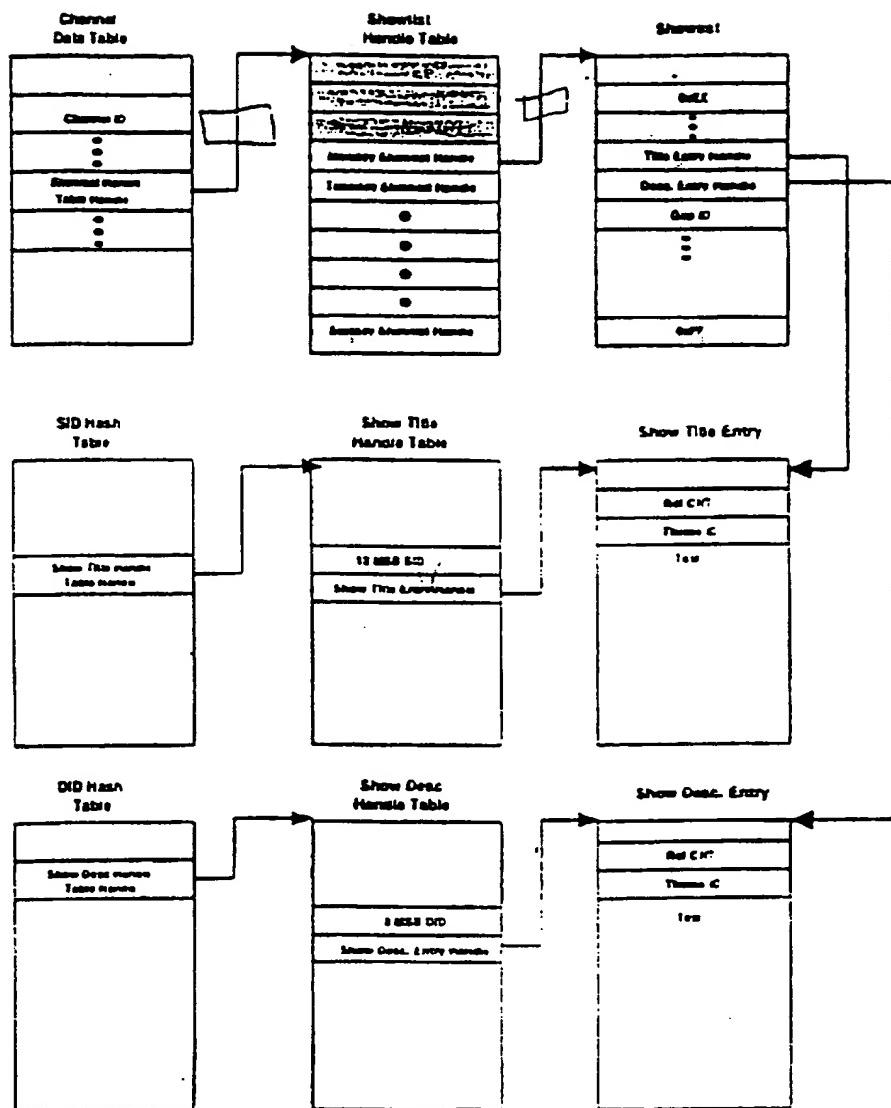


Fig. 3



Shared Data Table

میکل

Fig. 5 A

F. 5 B

Say This First

	7	6	5	4	3	2	1	0
0x00								
0x01	CNT	CCF	SF	BWC	-	REF CNT	MISB	
0x02								
0x03	MISB			THEME INDEX ID				LSB
0x04								
0x05								
0x06								
0x07								
0x08								
0x09								
0x0A								
0x0B								
0x0C								
0x0D								
0x0E								
0x0F								
0x10								
0x11								
0x12								
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0x16								
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0x18								
0x19								
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Show Department Fair

5

5L

FIG. 51

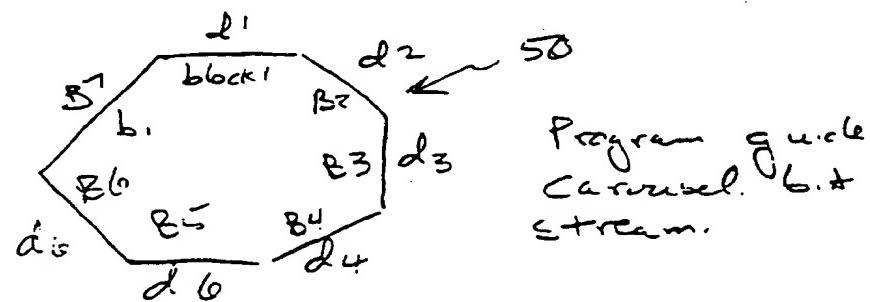
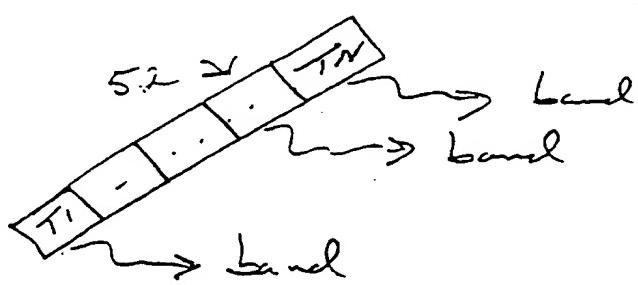
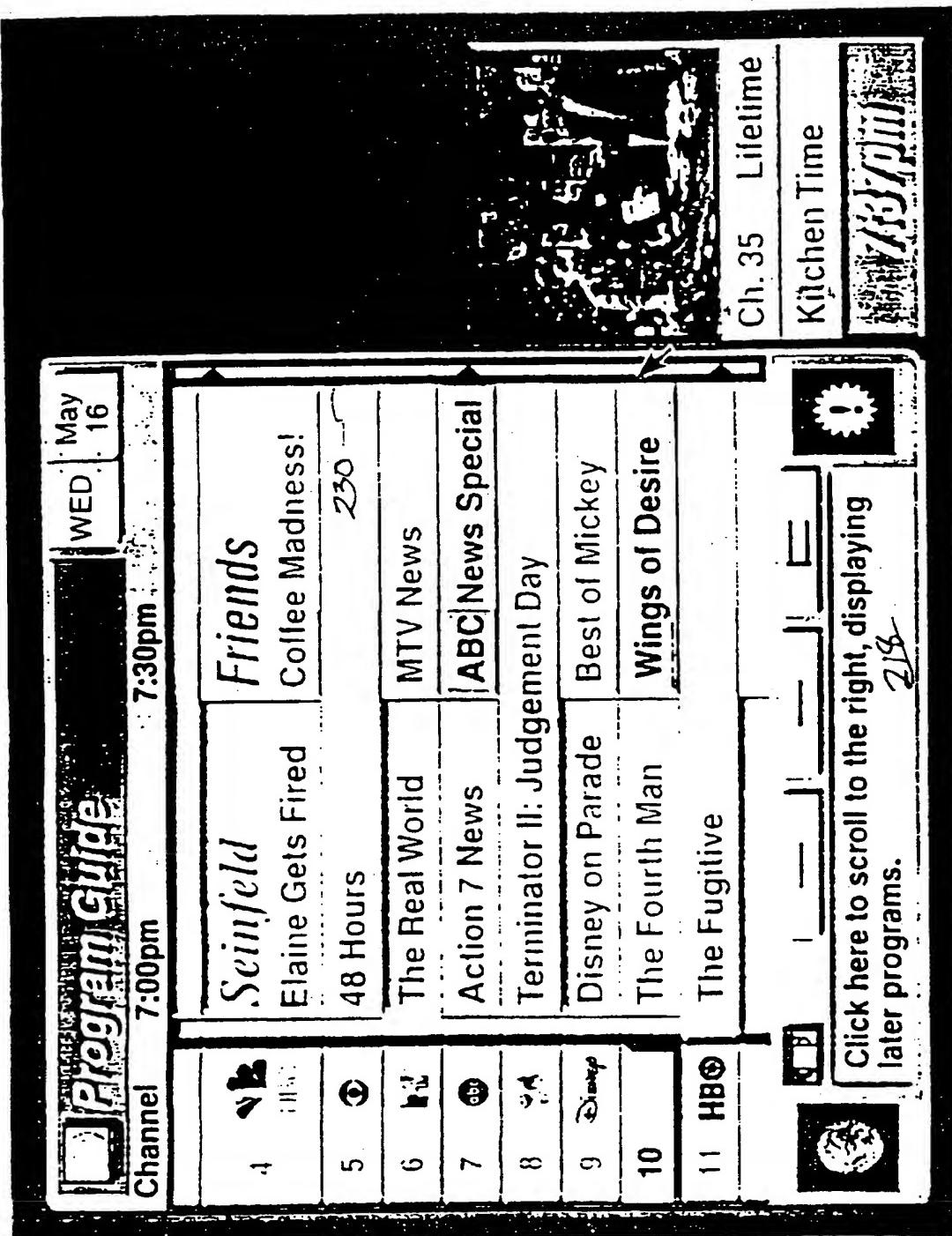


Fig. K

Fig. L

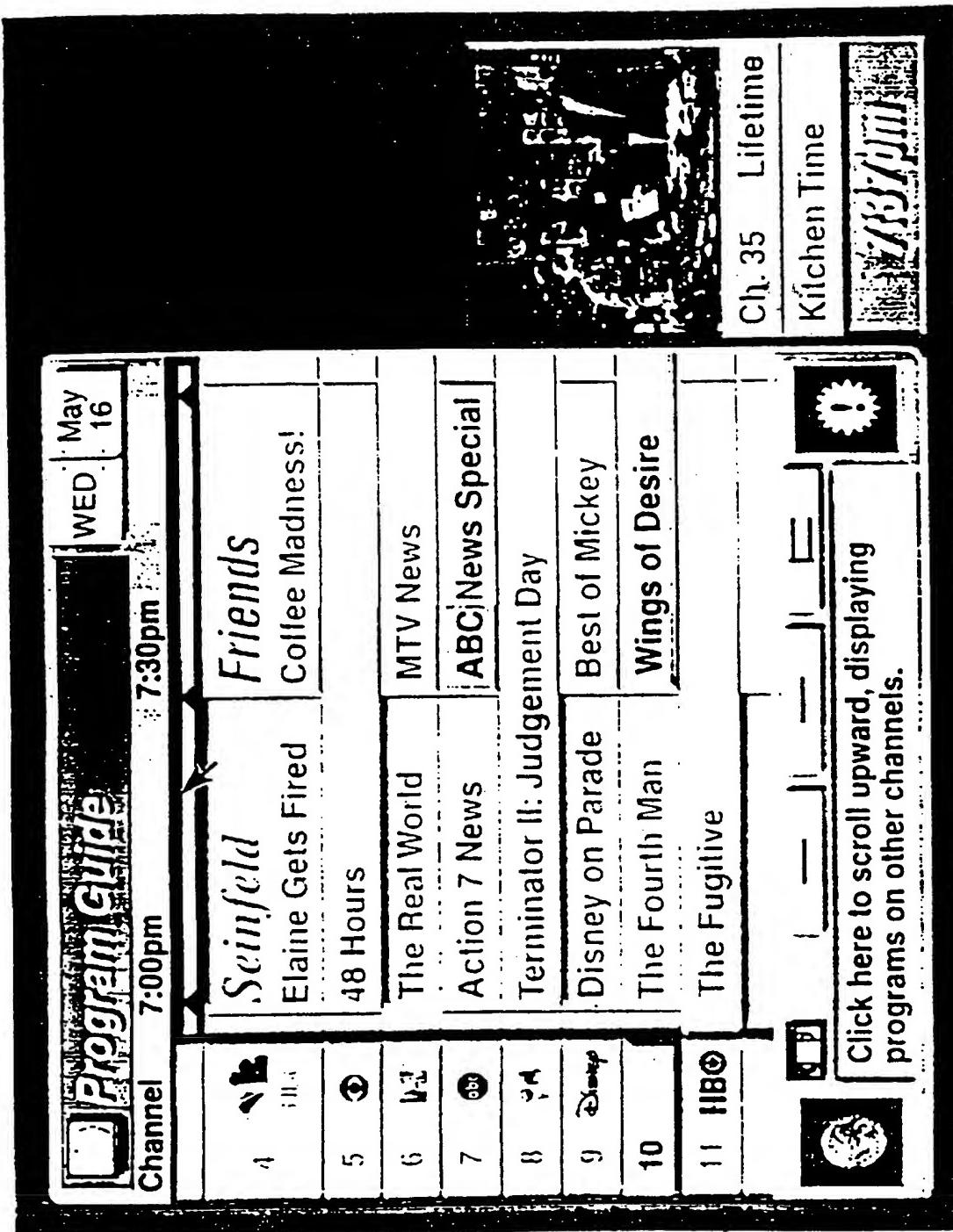
8/35



b4 Program Guide / Scroll Right
 The user has moved the cursor over the scroll right zone. The zone highlights in bright green with directional arrows indicating scrolling direction. The contextual help window tells the user he or she may scroll in the same direction the arrows point by clicking in that scroll zone. A single click here will scroll a half-hour segment forward in time. A click-and-hold will scroll a half-hour every half-second, accelerating over time as the user continues to hold, coming to a stop upon letting up.

Fig 7

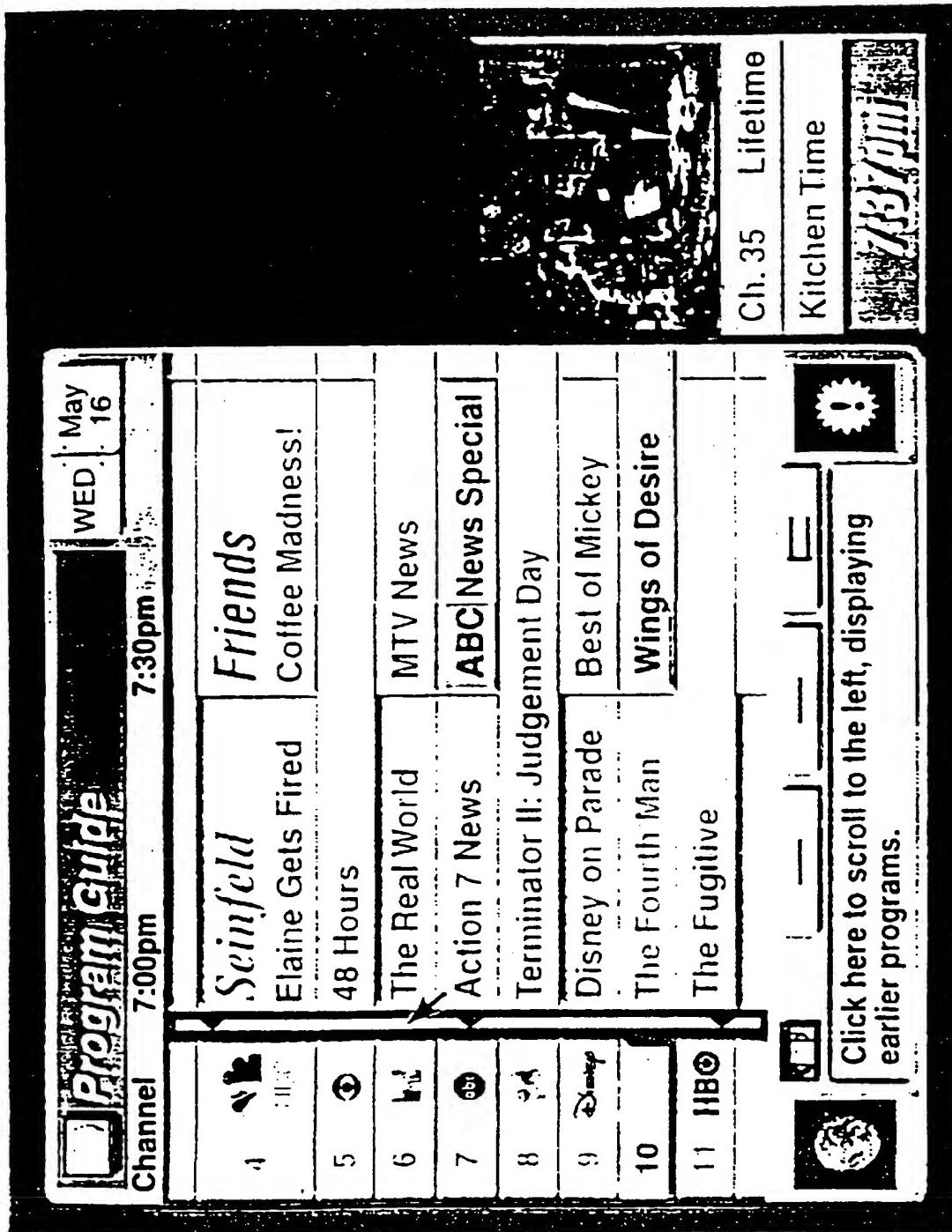
9/35



b5 Program Guide / Scroll Up
 The user has moved the cursor over the scroll up zone. The zone highlights in bright green with directional arrows indicating scrolling direction. The contextual help window tells the user he or she may scroll in the same direction the arrows point by clicking in that scroll zone. A single click here will page up nine single lines at time; (a complete vertical screen). A click and hold will page up nine single lines at time every half second, accelerating every time as the user continues to hold, coming to a stop when letting up.

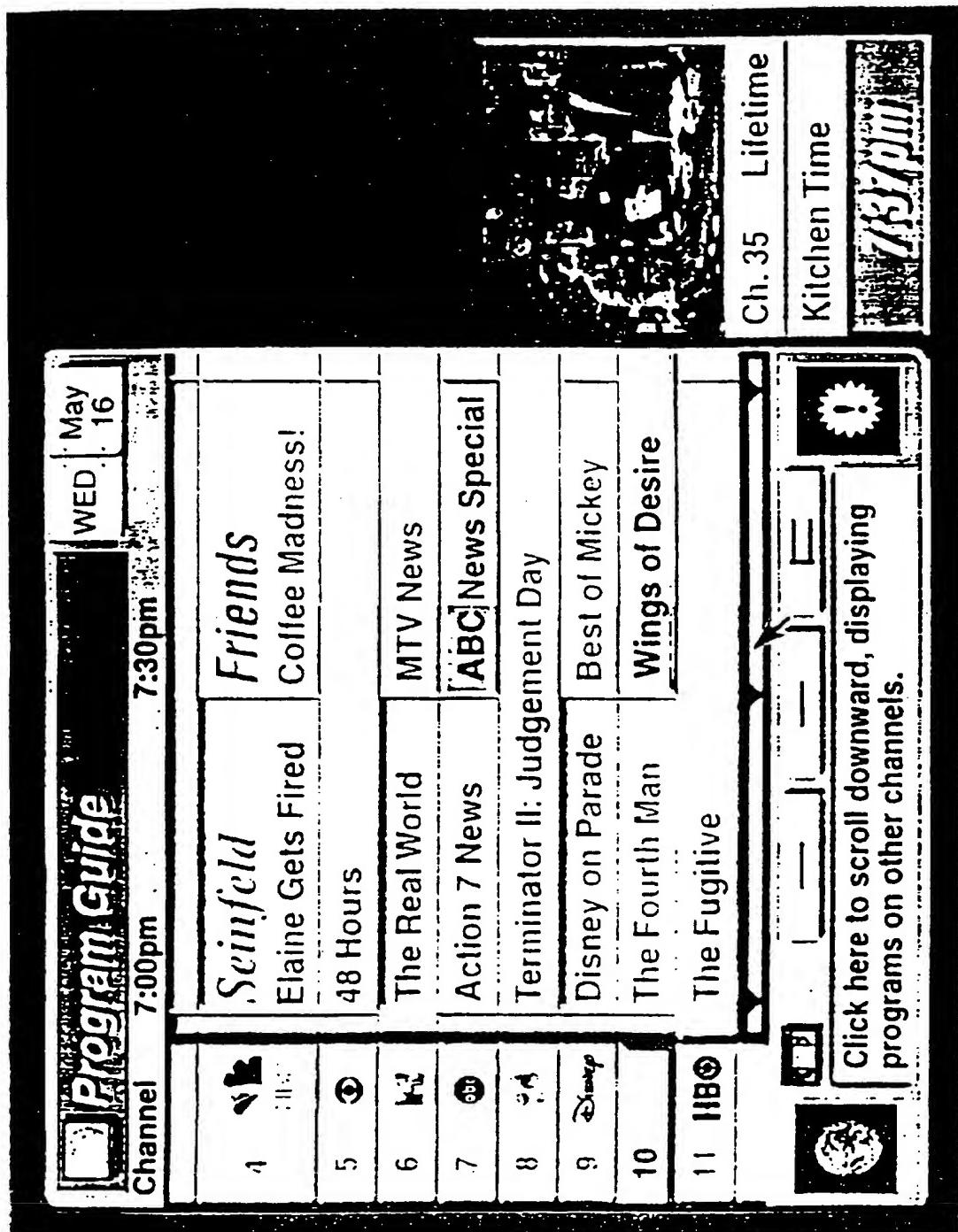
Fin 8

10/35



b6 Program Guide / Scroll Left
 This user has moved the cursor over the scroll left zone. The zone highlights in bright green with directional arrows indicating scrolling direction. The contextual help window tells the user he or she may scroll in the same direction the arrows point by clicking in that scroll zone. A single click here will scroll a half-hour segment backward in time. A click-and-hold will scroll a half-hour every half-second, accelerating over time as the user continues to hold coming to a stop upon hitting up.

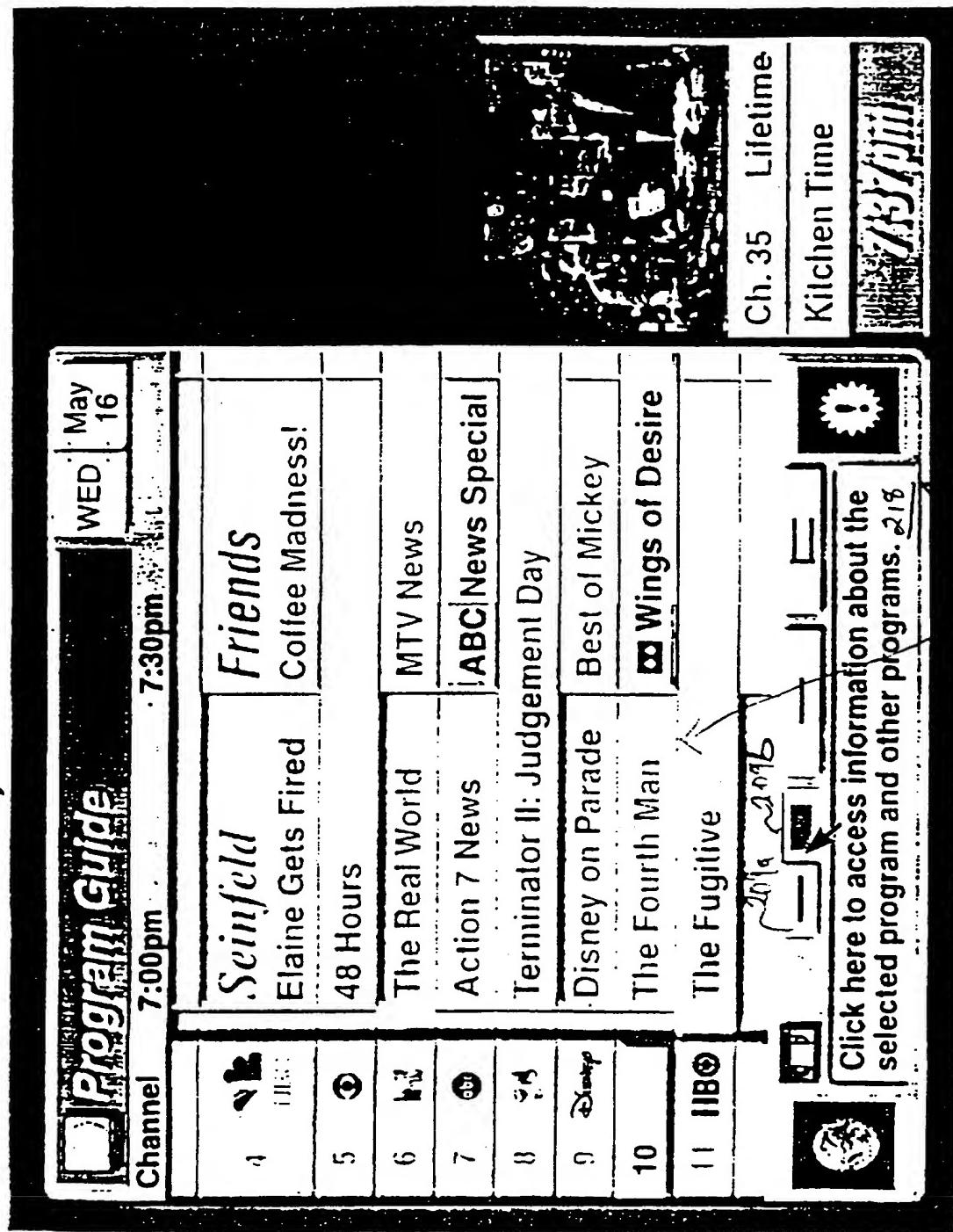
11/35

**b7 Program Guide / Scroll Down**

The user has moved the cursor over the scroll down zone. The zone highlights in bright green with directional arrows indicating scrolling direction. The contextual help window tells the user he or she may scroll in the same direction the arrows point by clicking in that scroll zone. A single click here will page down nine single lines at time (a complete vertical screen). A click and hold will page up nine single lines at time every half second, accelerating ever more as the user continues to hold down to a stop when letting up.

Fig 10

12/35



d1 Program Information / + Information Glyph
 The user has left the currently-selected program item and placed the cursor over the info glyph. Immediately, the glyph splits into a two-part recursive control, showing the two different informational configurations, and the currently selected titles, only configuration as highlighted (black and yellow). The contextual help window tells the user to click once to display information for the currently-selected program and other programs. This action is equivalent to "scrolling up" on a particular item in a grid or list to see its in-depth information.

10\

1.6

13/35

Program Guide

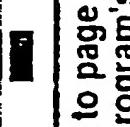
WED May 16	10	209c
1986 NR 2 Hours 30 Minutes	Wings of Desire	Double-click here to tune directly to this program.
Director: Wim Wenders. Actors: Bruno Ganz, Solveig Dommartin, Otto Sander, Peter Falk, Curt Bois. (French Title: Les Ailes Du Desir)	 Angels watch over humans in a walled Berlin. Upon falling in love with a circus trapeze artist (Solveig Dommartin), an angel becomes human and must learn to live life as a mortal being. Beautiful black and white cinematography by Henri	
	Ch. 35 Lifetime	Ch. 35 Lifetime
	Kitchen Time	Kitchen Time

Fri 12

d2 Program Information / Program Item Highlight
As soon as the user lets up, a transitional animation occurs and the currently selected program item moves to the top and information about that program stretches downward. Both elements stretch horizontally so that they occupy the public display area, leaving only scroll zones around the periphery. The user may now scroll around the public grid in the same manner as before, only now there is only one program item and its information displayed at any given time. The continual touch workflow tells the user to scroll in their directly to the

selected program

Program Guide

WED	May 16
10	<p>Wings of Desire</p> <p>▼ 1986 NR 2 Hours 30 Minutes Director: Wim Wenders. Actors: Bruno Ganz, Solveig Dommartin, Otto Sander, Peter Falk, Curt Bois. (French Title: Les Ailes Du Desir) Angels watch over humans in a walled Berlin. Upon falling in love with a circus trapeze artist (Solveig Dommartin), an angel becomes human and must learn to live life as a mortal being. Beautiful black and white cinematography by Henri</p> <p>◀</p> <p>Click here to page downward through the selected program's information.</p>      
Ch. 35 Lifetime	Lifetime
Kitchen Time	Kitchen Time

d3 Program Information / At Top of Information

This user has placed the cursor over the program's informational text, leaving the program item in its selected state (the single program item visible in this display configuration will always automatically be selected). When the user scrolls to another program, its information will be displayed and it will similarly become automatically selected. Since the text is scrollable, and it is shown here at the top, the entire text area is a hot area in which a user click will scroll the text down one page. The information's scroll indicator (top left of text) shows a

| | |
| | |

highlighted (yellow/scrollable) state in which both arrows point downward in the direction of scrolling. The contextual help window informs the user that clicking will result in paging down through the program's information.

Fig 13

Program Guide

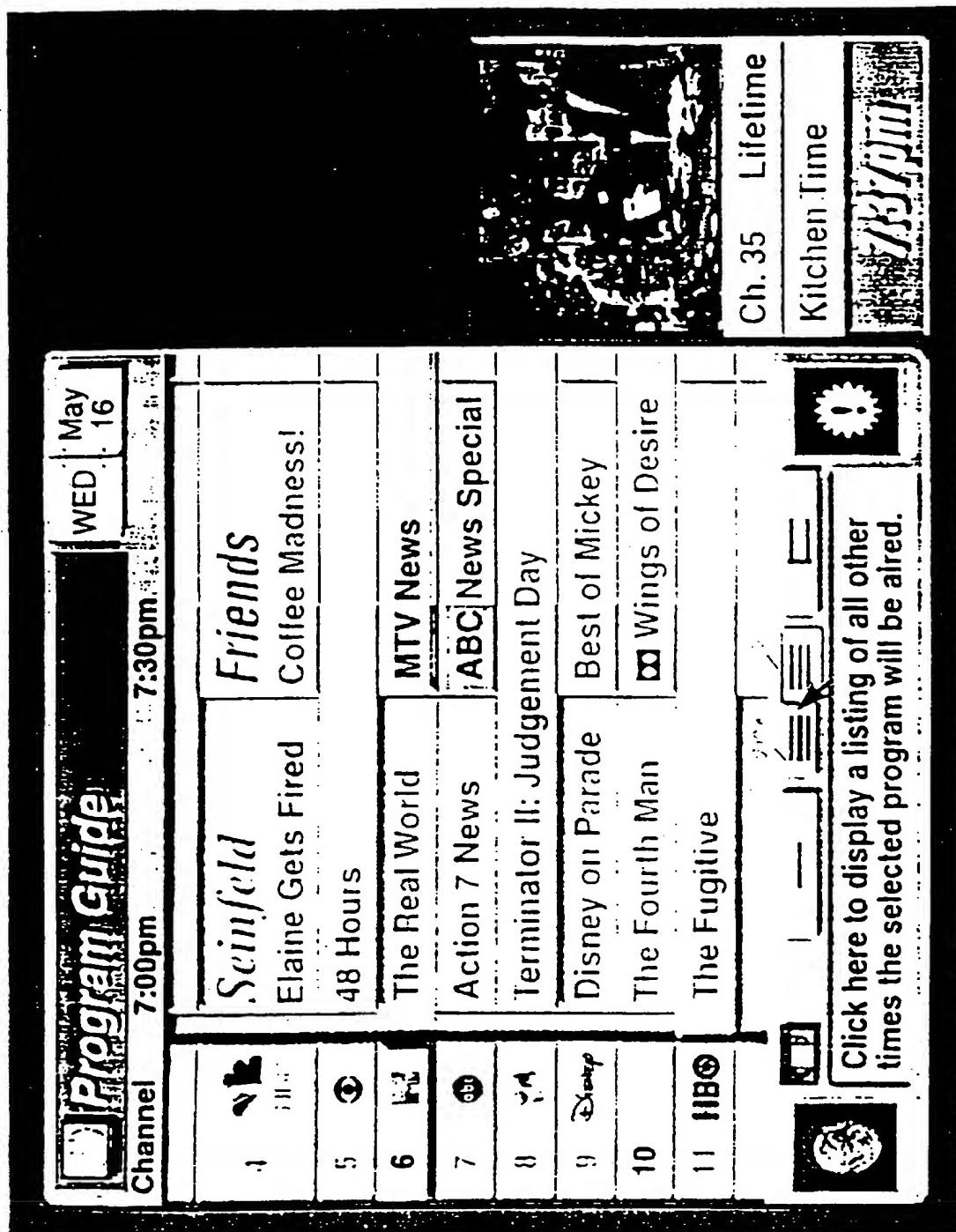
WED	May 16
10	Wings of Desire
<p>▼ 1986 NR 2 Hours 30 Minutes Director: Wim Wenders. Actors: Bruno Ganz, Solveig Dommartin, Otto Sander, Peter Falk, Curt Bois. (French Title: Les Ailes Du Desir) Angels watch over humans in a walled Berlin. Upon falling in love with a circus trapeze artist (Solveig Dommartin), an angel becomes human and must learn to live life as a mortal being. Beautiful black and white cinematography by Henri</p>	
	
Ch. 35	Lifetime
	
	
<p>Click here to access the program guide grid to see listings of all programs.</p>	

d6 Program Information / - Information Glyph

The user has moved the cursor completely out of the display area (note that the text area's scroll indicators are no longer yellow), and placed it over the info glyph immediately as before. The area becomes split into two, showing the two different zoom configurations, with the currently selected program information symbol as highlighted (black and yellow). The continental half window lets the user to click once to see the listings of all programs, which will return the display area to the "normal" program guide grid, displaying program icons only.

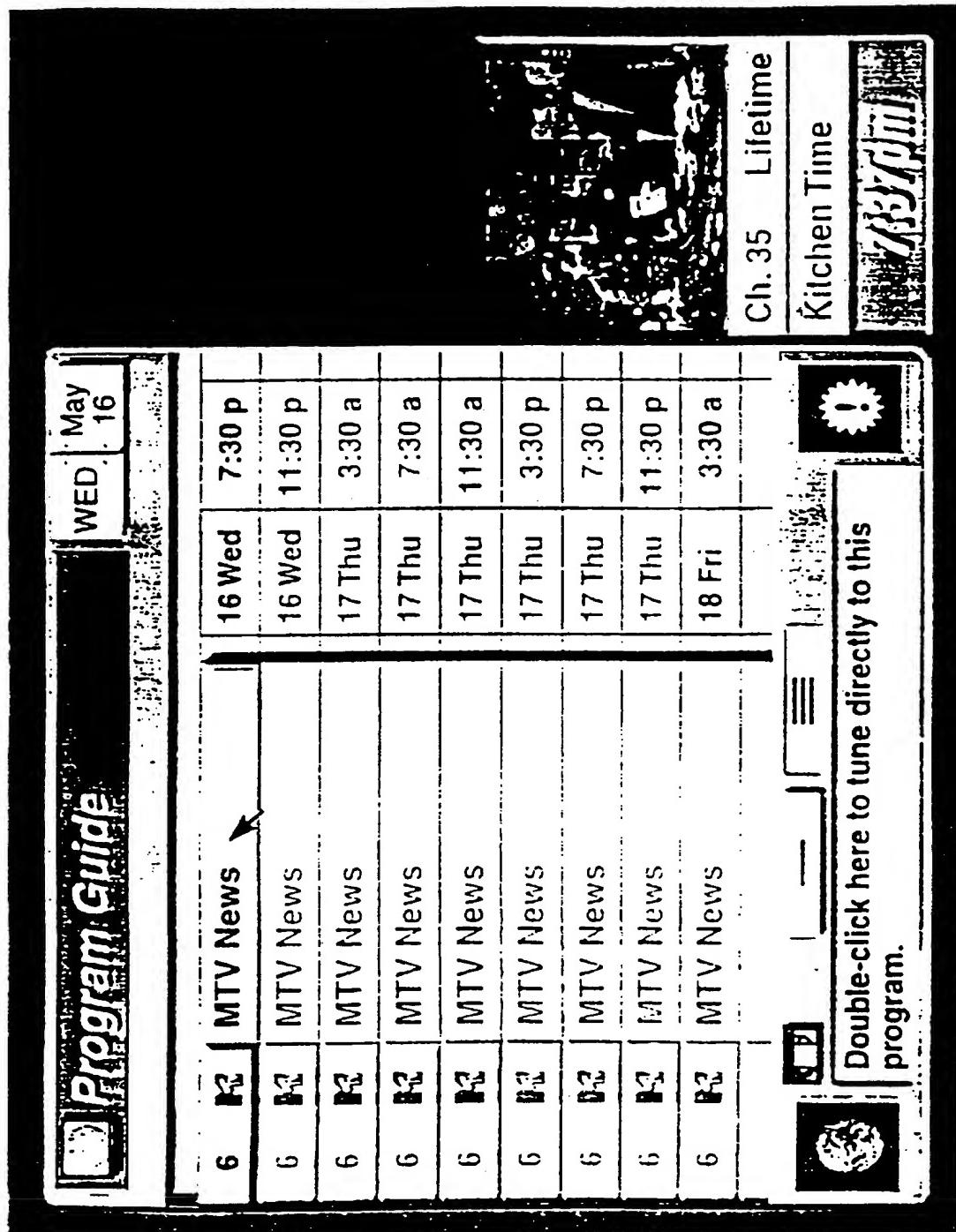
Fig 14

16/35

**e3 Finding Other Programs / + Find Glyph**

The user has left the selected program item and placed the cursor over the find others glyph. Immediately, the area becomes split into two, showing the two states of this display action control, with the currently-selected single-program configuration as highlighted (black and yellow). The contextual help window tells the user to click once to display a listing of all other times the currently-selected program will be aired.

17/35

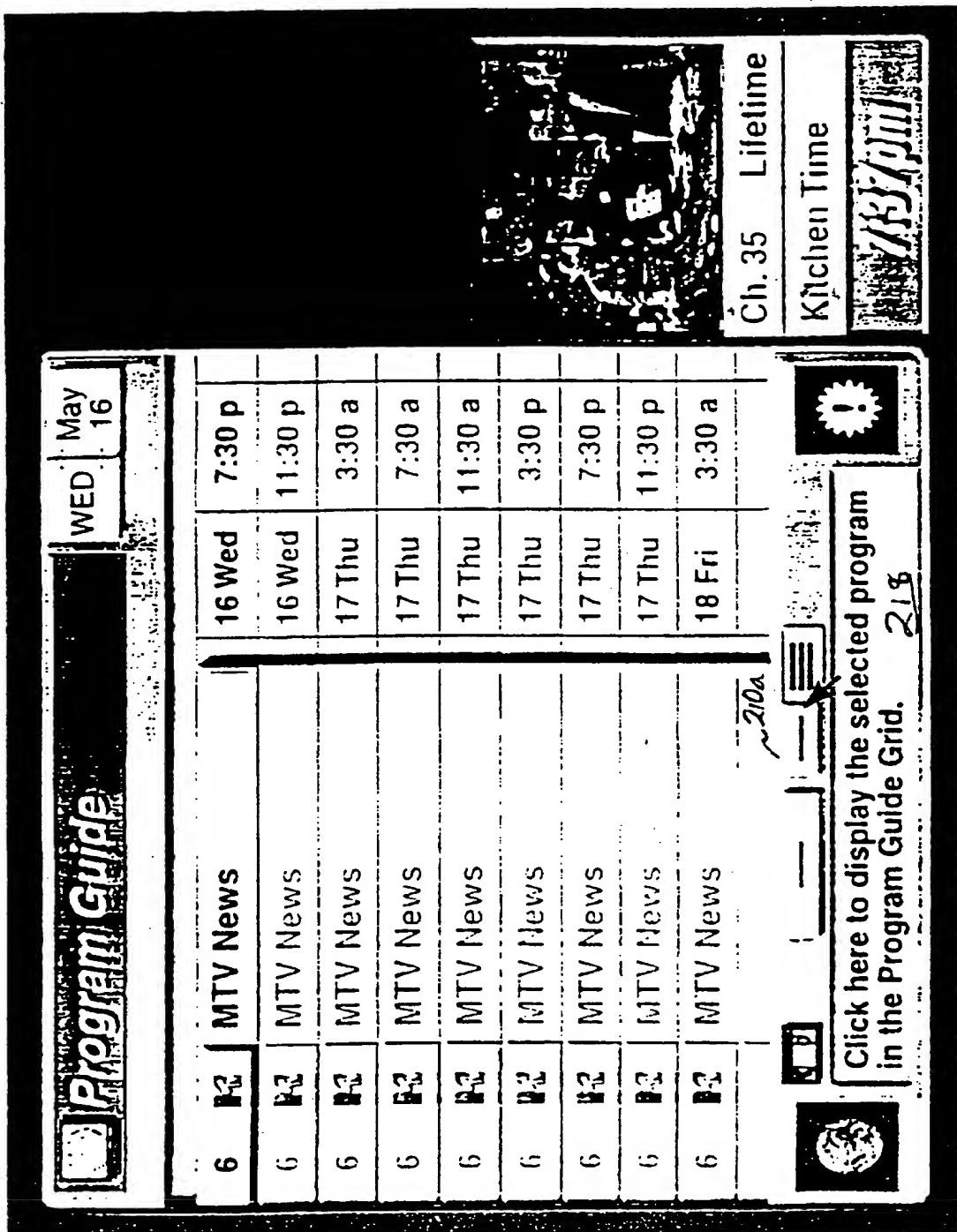


c4 Finding Other Programs / Search Results
 After clicking the find others glyph, the system displays a listing of all occurrences of the selected program in chronological order, with the currently selected program item being the one that automatically appears selected. In this example, all others fall after the selected program, however it's possible that the user could conduct such a search from a future program and the ADS would return some occurrences of the program among before the selected program. In those cases, they would appear above the currently selected program in the results list and

could be scrolled up through if necessary. The contextual help window tells the user that he or she may tune directly to the currently-selected program by double clicking on the program item

Fig 16

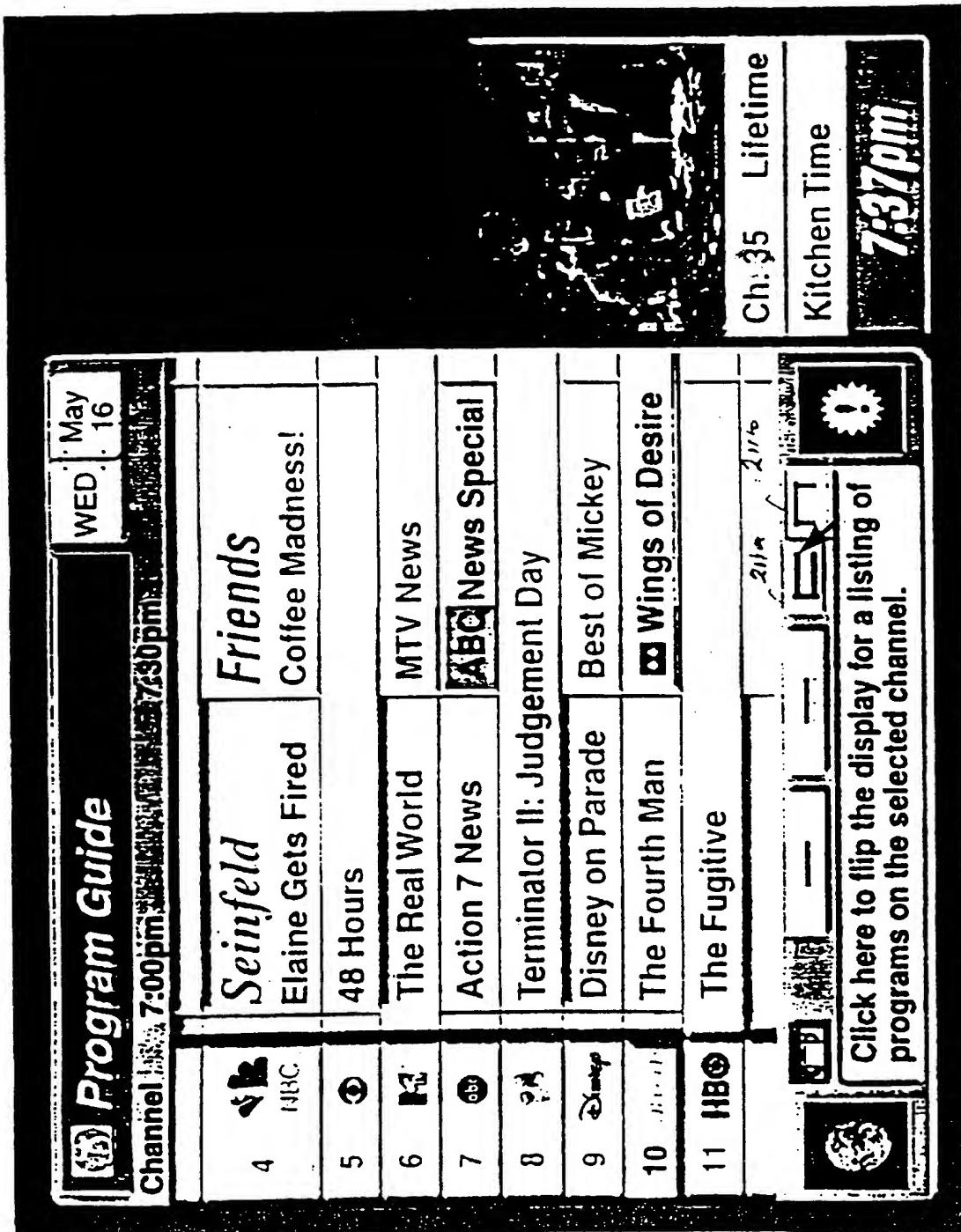
18/35



e5 Finding Other Programs / - Find Glyph
 The user, wanting to return to the program guide grid, moves the cursor down out of the display area and onto the find others glyph where it again splits into its two symbols. This time, the other side of the control is shown as selected (black and yellow). Clicking anywhere on this symbol will inversely set the display area back to the initial configuration, showing the currently selected program item among others in the program guide grid. The user could just as easily come from a lecture in a different configuration of the grid, and so, would return to that configuration instead.

Fig 17

19/35



11 Grid Vertical Flip / + Vertical Flip Glyph
 The user has left the currently-selected program item and placed the cursor over the HFC glyph. Immediately, the area becomes split into two, showing the two different flip configurations, and the currently selected horizontal configuration as highlighted (black and yellow). The contextual help window tells the user to click once to flip the display for a listing of all programs on the currently selected channel.

20/35

Program Guide

May 16	
WED	
10	11 12
7:00 pm The Fourth Man	
7:30 pm	▣ Wings of Desire
10:00 pm	Thorny's Late Show
11:00 pm	Cinemax Tonight
11:30 pm	The Disney Special
12:00 am	Late Night
1:00 am	Always By My Side

208 209 210 211

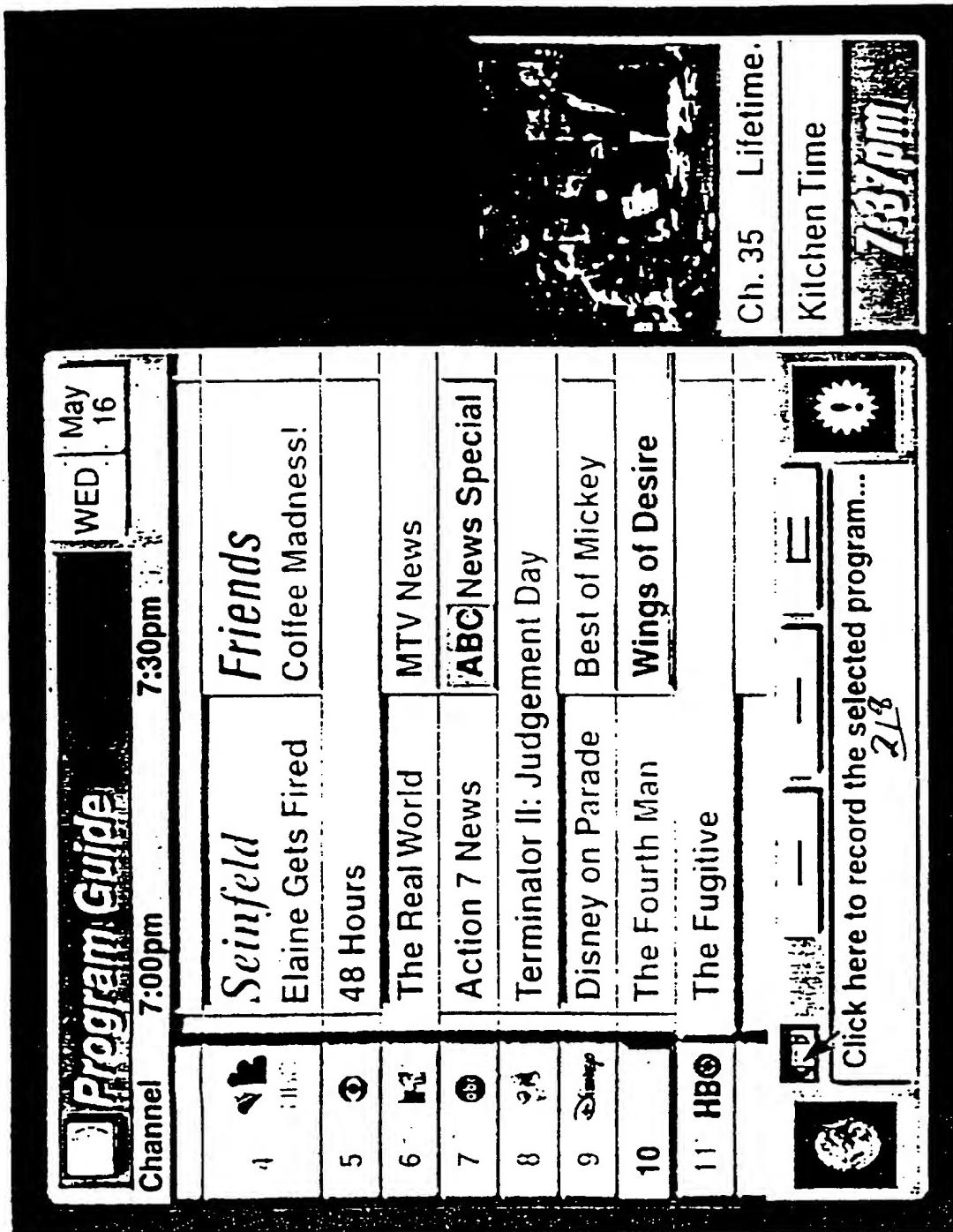
Double-click here to tune directly to the selected program.

I2 Grid Vertical Flip / Program Item Click

As soon as the user lets up, a transitional animation occurs and the display area rotates clockwise so that the current channel item is stretched across the top, with the programs that were laid out horizontally before, now listed vertically below it. The display area is now configured similarly to the current StarSight system's "Channel Guide" configuration. The contextual help window tells the user that he or she may double-click to tune directly to the currently selected program.

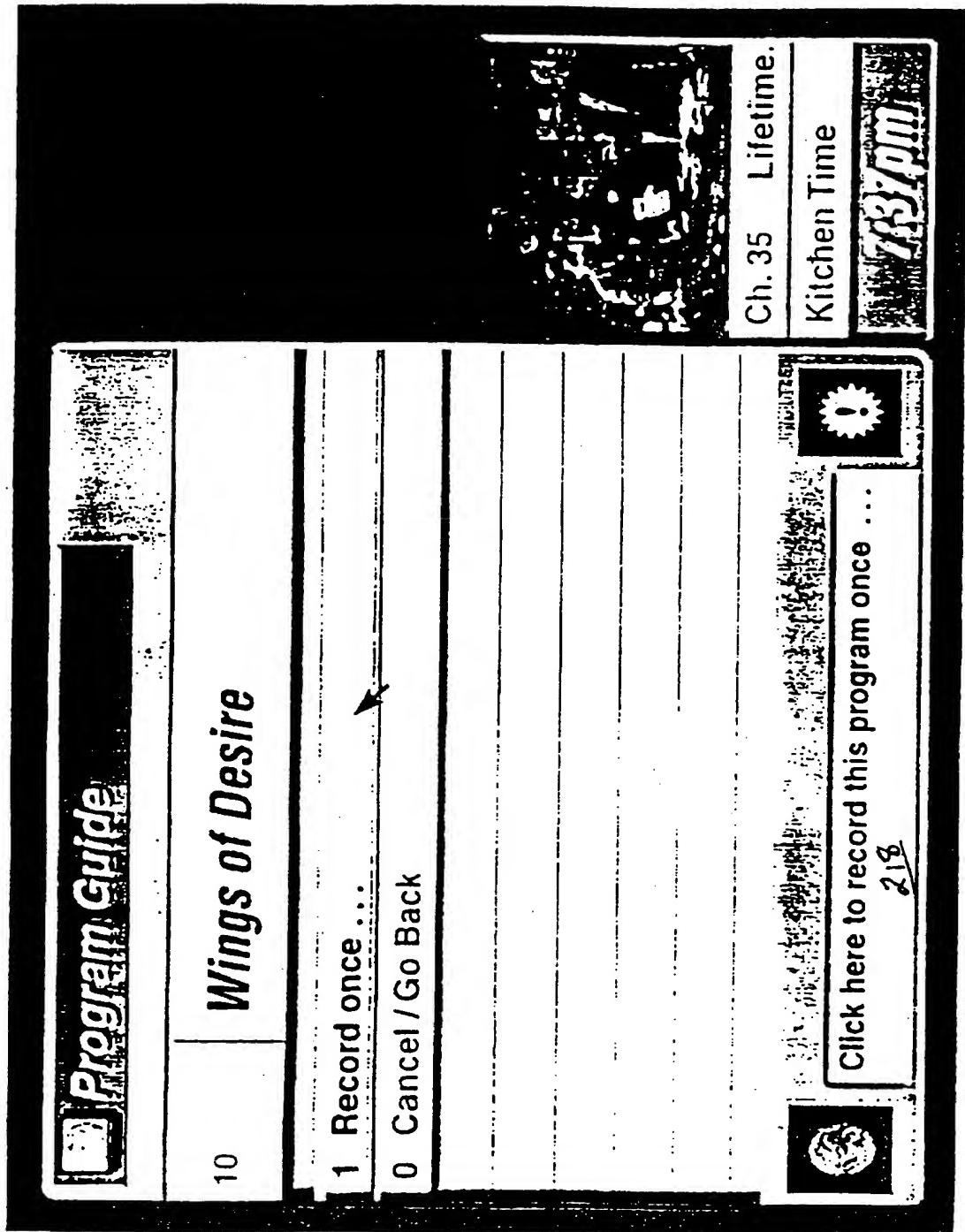
Fig. 19

21/35



c1 Recording a Program / Glyph Click
 The user has moved the cursor over the record glyph and it has changed to its highlighted state. The contextual help window tells the user that this glyph may be clicked on to record the currently-selected program item. By clicking the recording glyph, a recording submenu sequence automatically follows.

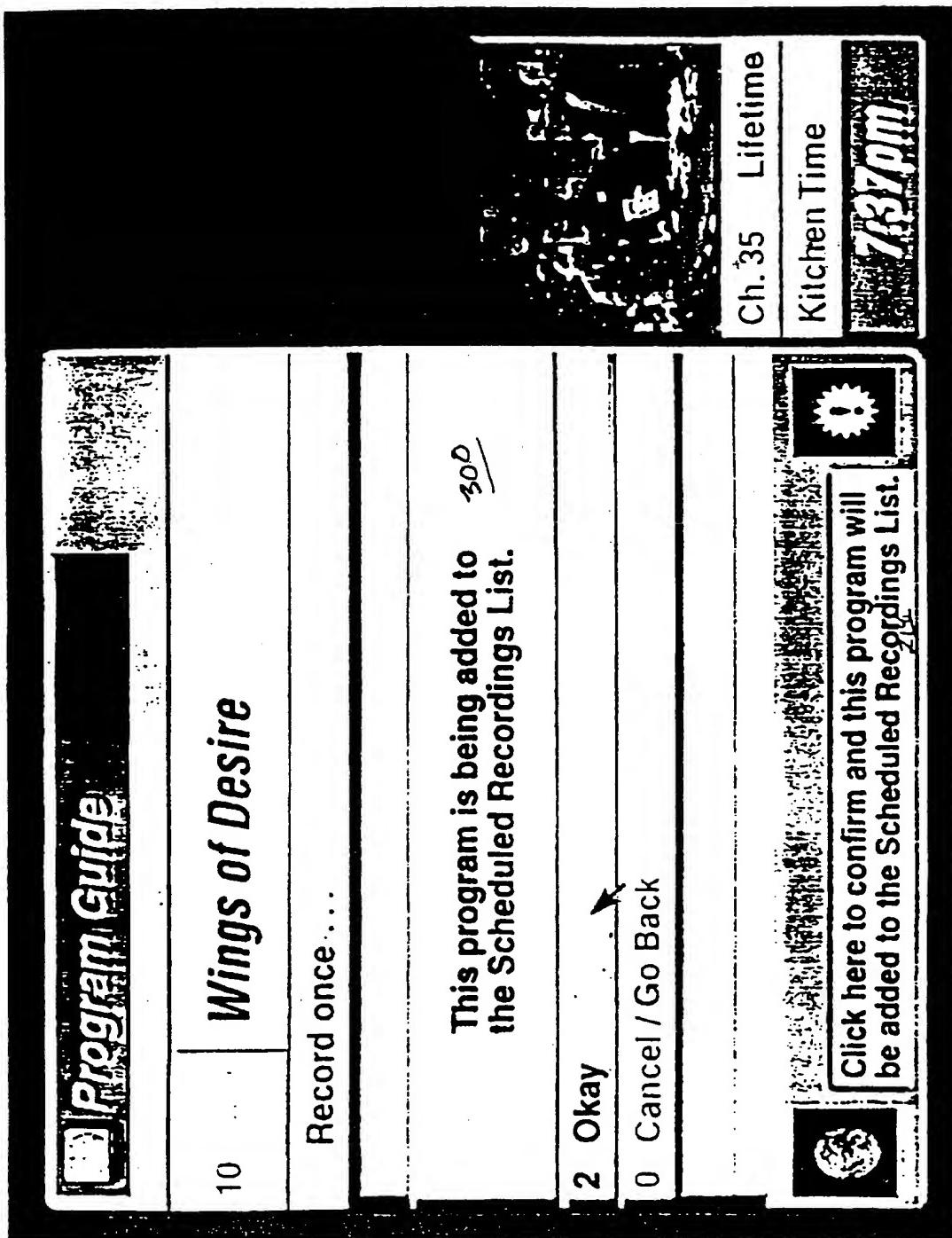
22/35

**c2 Recording a Program / Record Once Click**

The user has moved the cursor over the top item "Record once ..." . The item is automatically highlighted. When the user clicks, the item is momentarily rendered in the selected-state (upon click-down). Since "Record once" is the only recording frequency available for this particular program, it is the only one that appears. Other programs may have "Record Daily", "Record Weekly", "Record entire minutes ..." etc., as appropriate. The display action controls disappear during this functional sequence. Inversely this will affect certain controls, when

appropriate. The option to remove ("Remove Program from Recording List ...") only appears when a program item has already been placed on the recordings list, while "Cancel / Go Back" always appears. The numbers shown on the items are key entry equivalents. For this reason, direct keyboard entered tuning is disabled during functional sequences such as recording. The contextual help window tells the user to click once on the selected item to record the program only!

Fig 2.1

**C.3 Recording a Program / Confirmation**

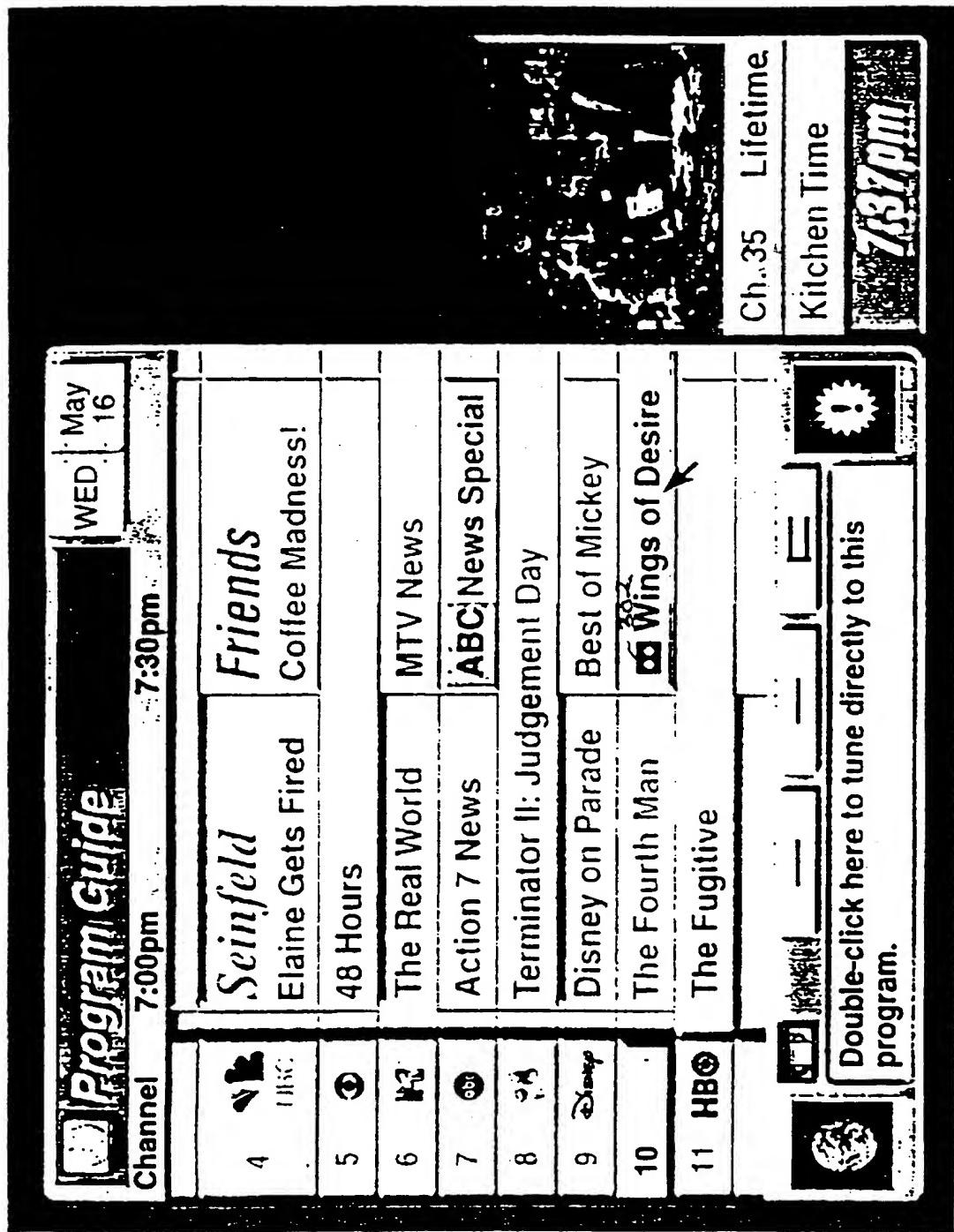
The user has clicked once on the "Record once" item and the confirmation screen appears. The user has placed the cursor over the "Okay" item. The contextual help window tells the user to click once to confirm that the program is being added to the recordings list. Above the dialog box is shown the previously-clicked parent item, "Record once". The user can click on that item to go directly back to the previous step. In certain functional sequences, where there might be several levels, the most recent parent will be visible here, with super-

parents accessible by scrolling up

(important note: in the example shown, the program is currently playing, so activating a record sequence would quickly turn the VCR on. The functional sequence shown, involving the addition of the program item to the Scheduled Recordings List is more appropriate for future programs not currently being aired)

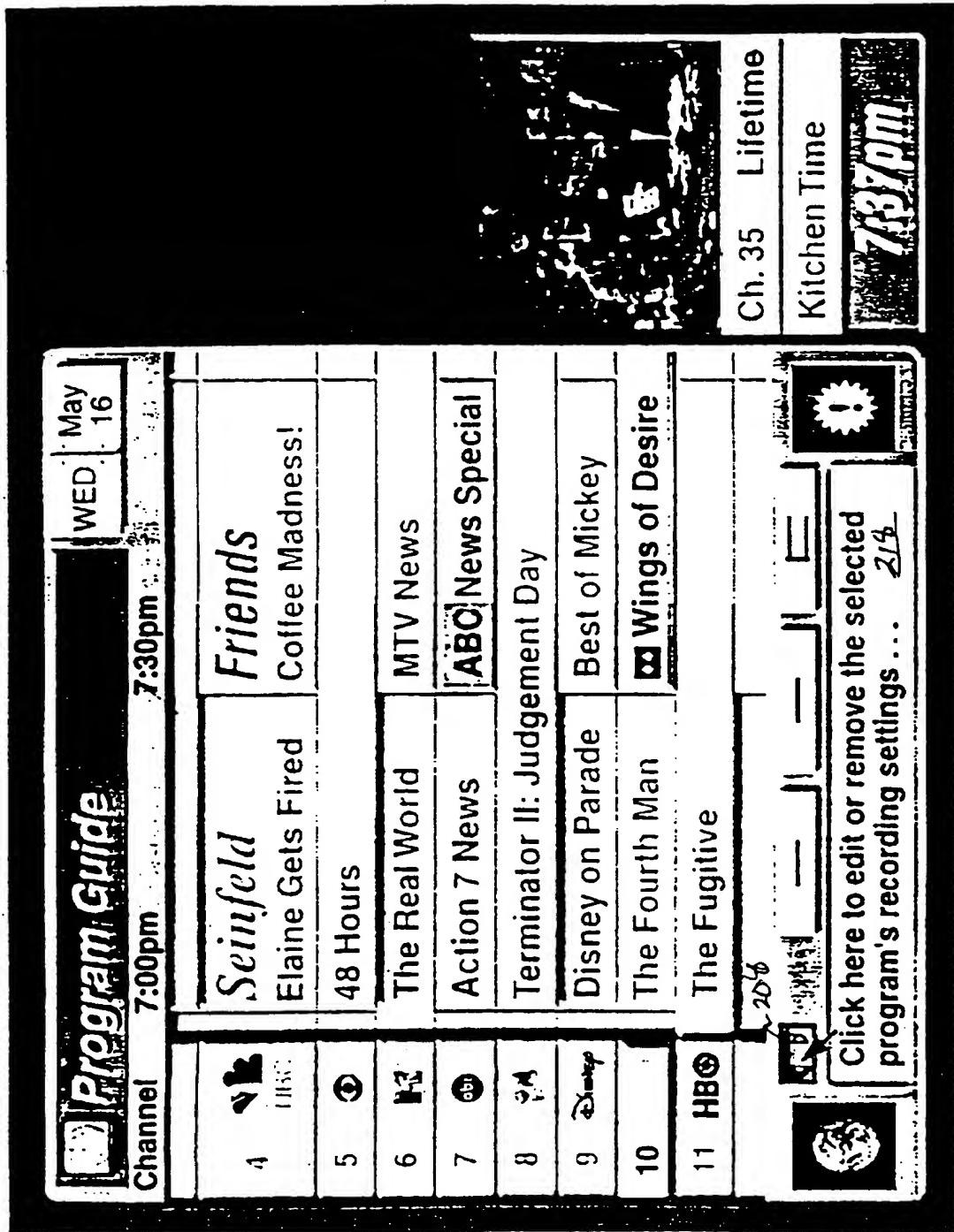
Fig. 22

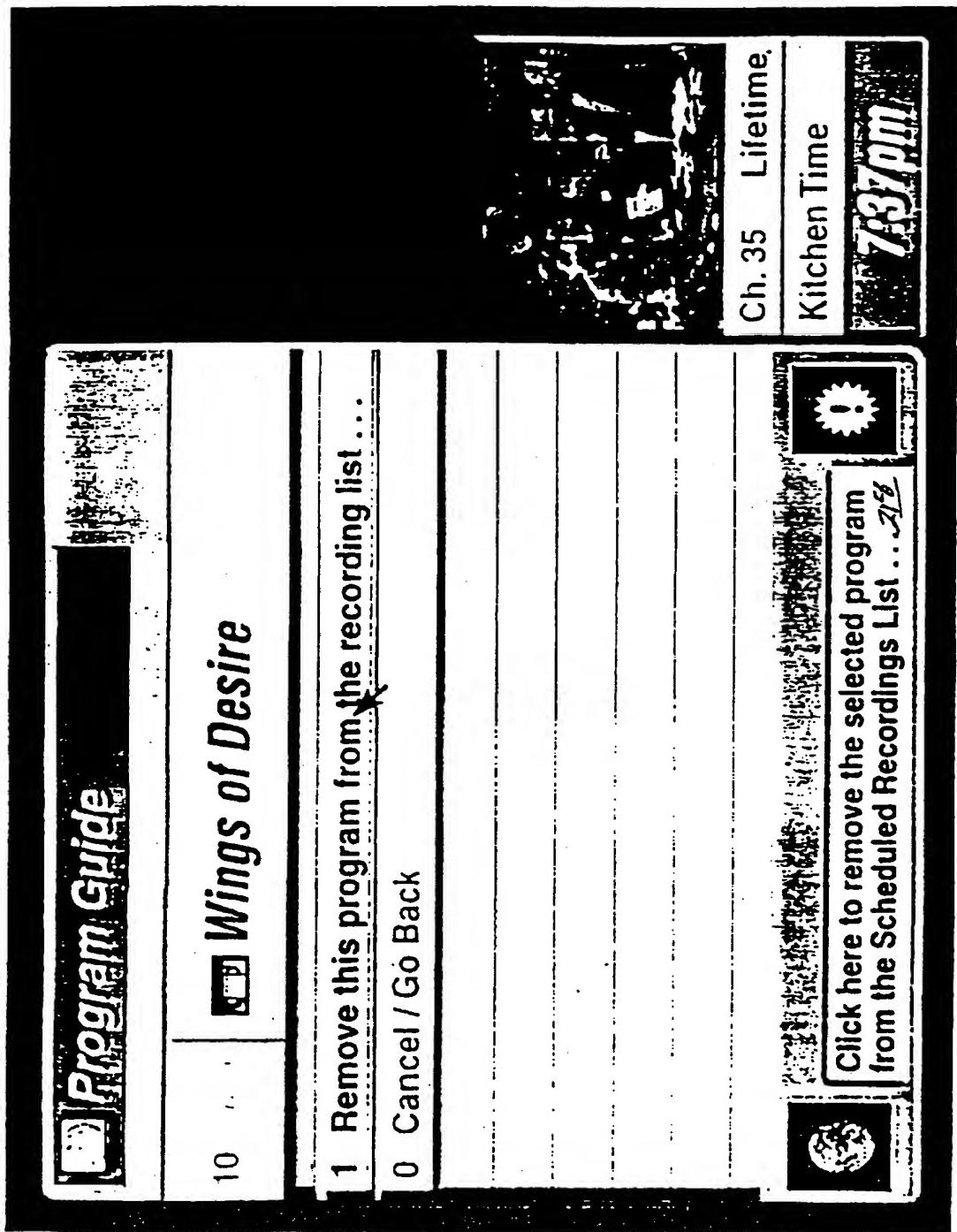
24/35



c4 Recording a Program / Program Item Record Glyph
 When the user returns from the recording scheduling sequence, a tape symbol has been added to the program item. This glyph will appear on all instantiations of this program item wherever displayed (on any gridlist anywhere in the ADS) for as long as valid.

25/35



**c6 Remove Recording / Remove Click**

The user has moved the cursor over the item 'Remove this program from the recording list'. The item is automatically highlighted. When the user clicks, the item is momentarily rendered in the selected state (upon click-down). The 'Record once' item is gone; however, if this were a program with multiple recording frequency settings possible, the remaining settings would be accessible at this point, allowing the user additional changing options in addition to removal of the program from the Scheduled Recordings list; although the display action

controls disappear during this functional sequence, leaving the web and linked services icons when appropriate. The item, 'Cancel / Go Back' always appears. The contextual help window tells the user to click once to remove the program from the Scheduled Recordings List.

Fig 25

27/35

Program Guide

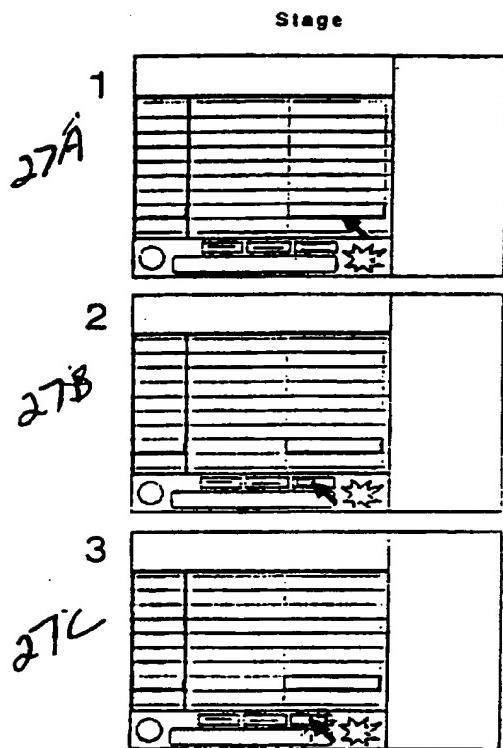
		WED May 16	
Channel	7:00pm	7:30pm	
4		Seinfeld Elaine Gets Fired	Friends Coffee Madness!
5		48 Hours	
6		The Real World	MTV News
7		Action 7 News	ABC News Special
8		Terminator II: Judgement Day	
9		Disney on Parade	Best of Mickey
10		The Fourth Man	Wings of Desire
11		The Fugitive	
Tune to Wings of Desire Return to Kitchen Time			
Ch. 35 Lifetime Kitchen Time			

Click here to tune to the currently selected program.

b8 Program Guide / Video Window
 The user has left the selected program item and placed the cursor over the live video window and the area is split into two interactive areas, with the top portion as an interactive area in which the user may click to tune directly to the program "Wings of Desire," which is shown as the currently-selected program. The user may click on the bottom portion to return to the currently-tuned program, "Kitchen Time." The contextual help window accompanies this split live video window function.

Fig 26

220

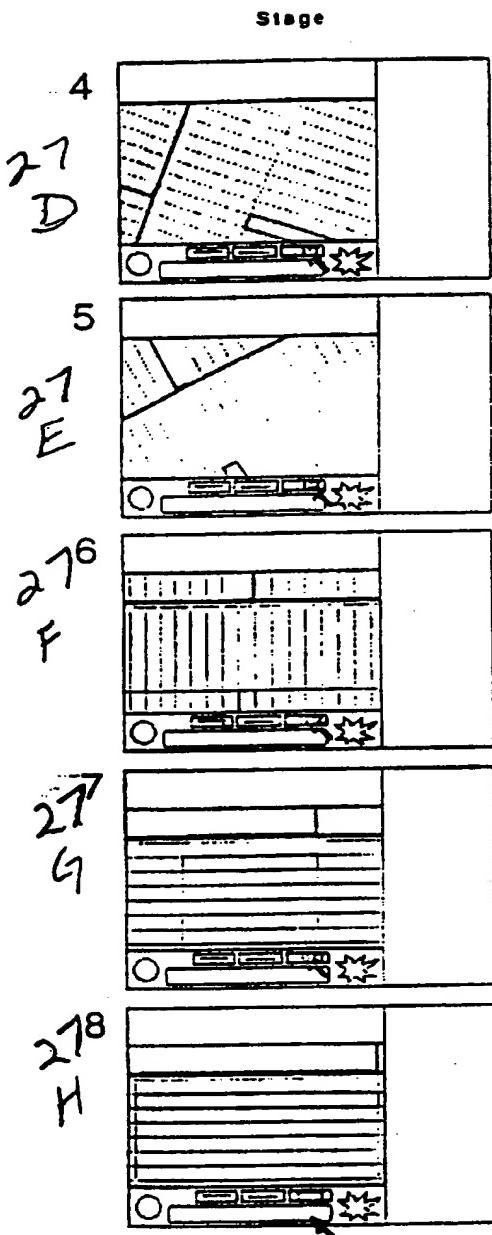
Flip Activation Sequence

In stage 1, the user has the cursor placed over the selected program item bar. To activate the flip button the user must leave the program item and navigate towards the lower right region of the icons panel in which the flip button is located (See Stage 2).

In stage 2, the user has left the selected program item bar (indicated by the shaded, rendered bar in the lower right region of the program guide grid) selected, navigated to the flip icon and has placed the cursor over the flip-horizontal button. Immediately, the flip-horizontal and flip-vertical buttons appear and the flip-horizontal button is highlighted while the flip-vertical button is unselected (See Stage 3).

In stage 3, the user has clicked once with the cursor over the flip buttons area. Once the flip buttons area is clicked on, the flip function is activated and the automated flip transitional metamorphosis begins (See Stage 4).

Fig 27

Automated Flip Transitional Metamorphosis (Transitional Sequence)

In stage 4, the automated flip transitional metamorphosis has begun. The program guide grid has made a partial clockwise rotation.

In stage 5, the program guide grid has yet rotated even more in the same clockwise rotational direction.

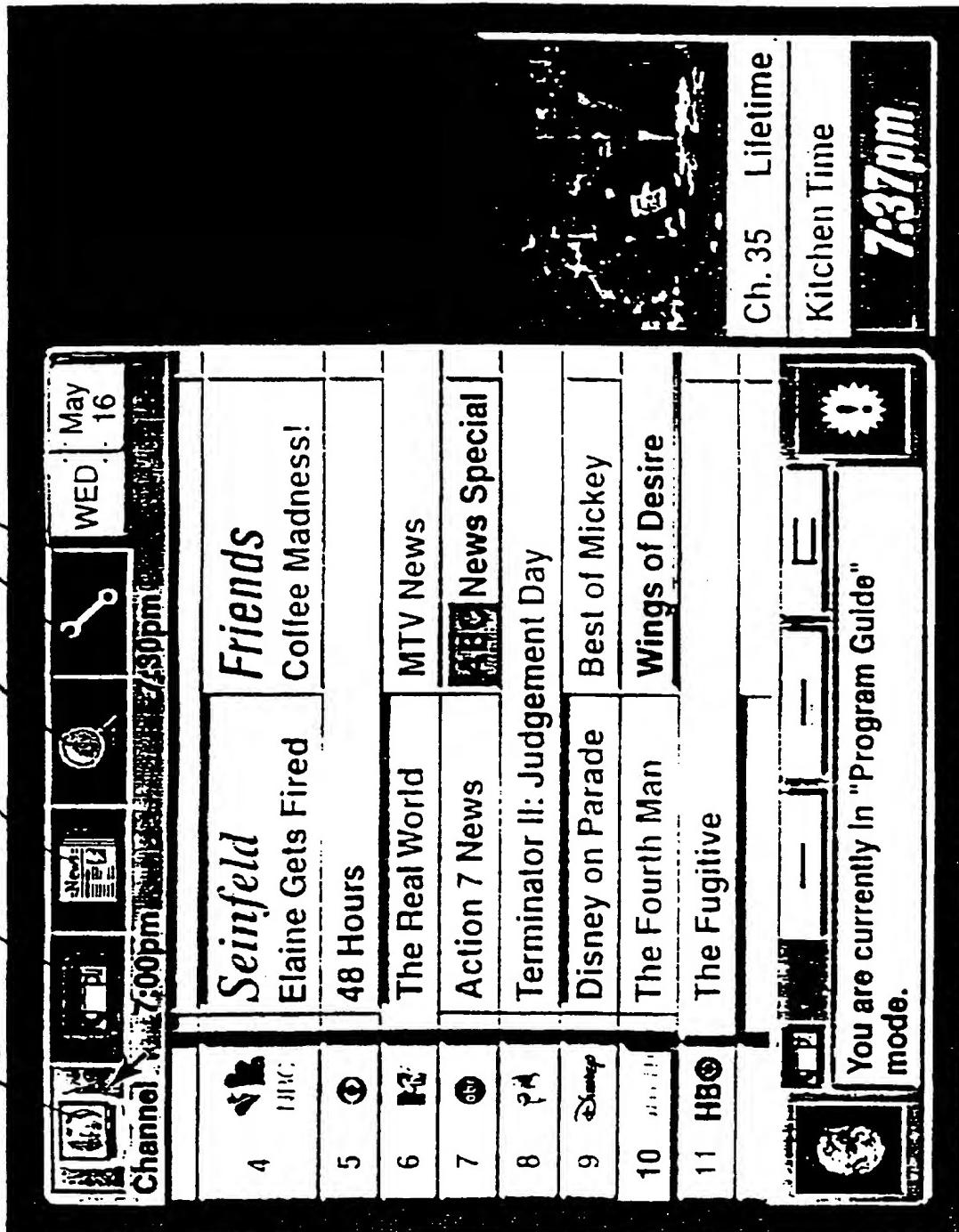
In stage 6, the program guide grid has rotated ninety degrees clockwise, with its channel tractor bar height equivalent to its height in the flip-vertical configuration.

In stage 7, both the channel tractor bar and the program item bar have begun to expand horizontally to their right and left sides, while their neighbors are also proportioned equivalently to either of them. The channel bars to the right and left of the selected channel tractor bar are proportioned the same as the selected channel tractor bar. The program item bars to the right and left to the selected program item bar are proportioned the same as the selected program item bar. The program grid has been compressed vertically and stretched horizontally to reconfigure itself to the eventual flip-vertical configuration (See Stage 8).

In stage 8, the automated flip transitional metamorphosis ends. This is the program guide in its flip-vertical configuration. The user has moved the cursor out of the icons region to display the flip-vertical orientation. The text reappears and the programs are now configured in columnar fashion according to channel. The user is now free to navigate.

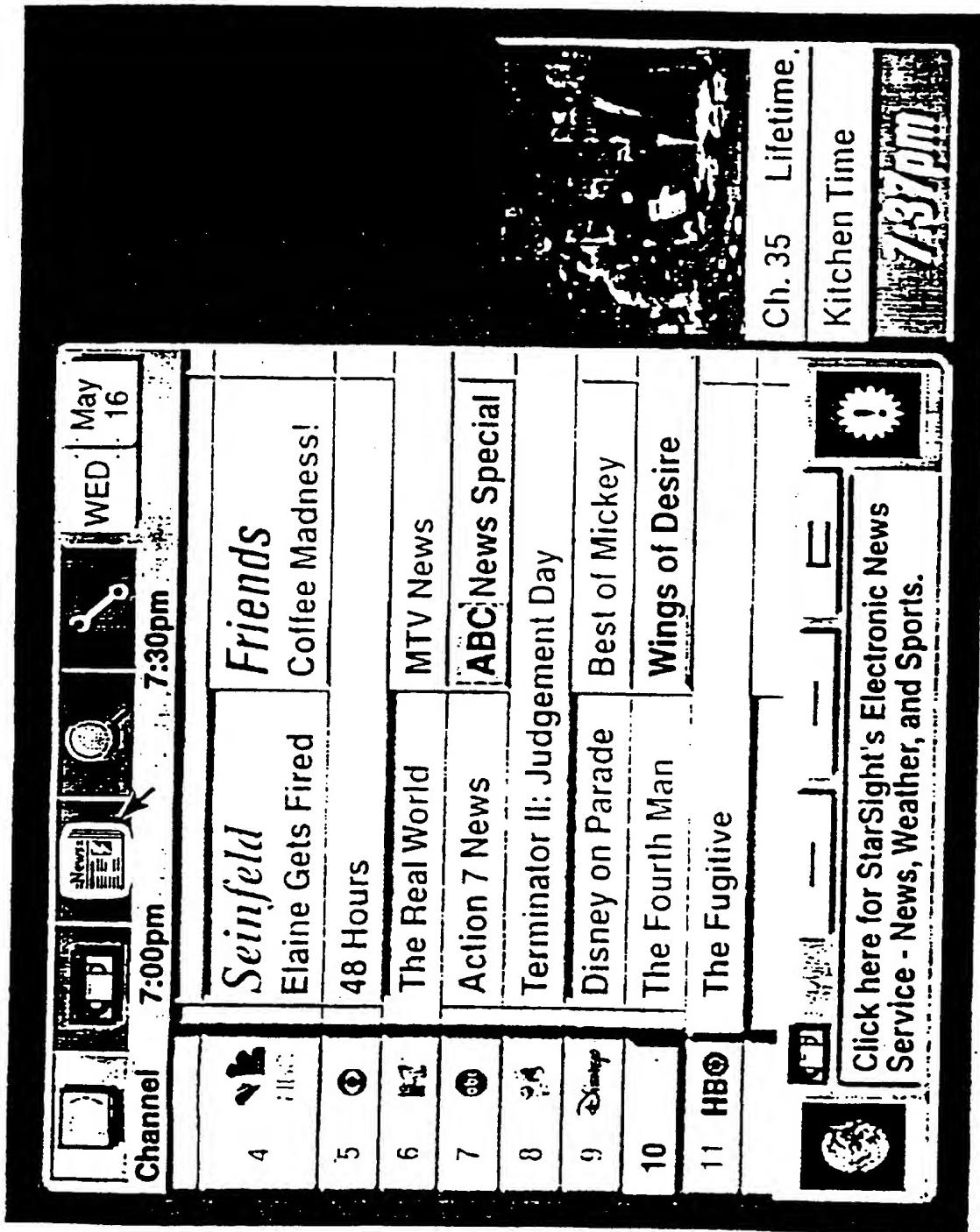
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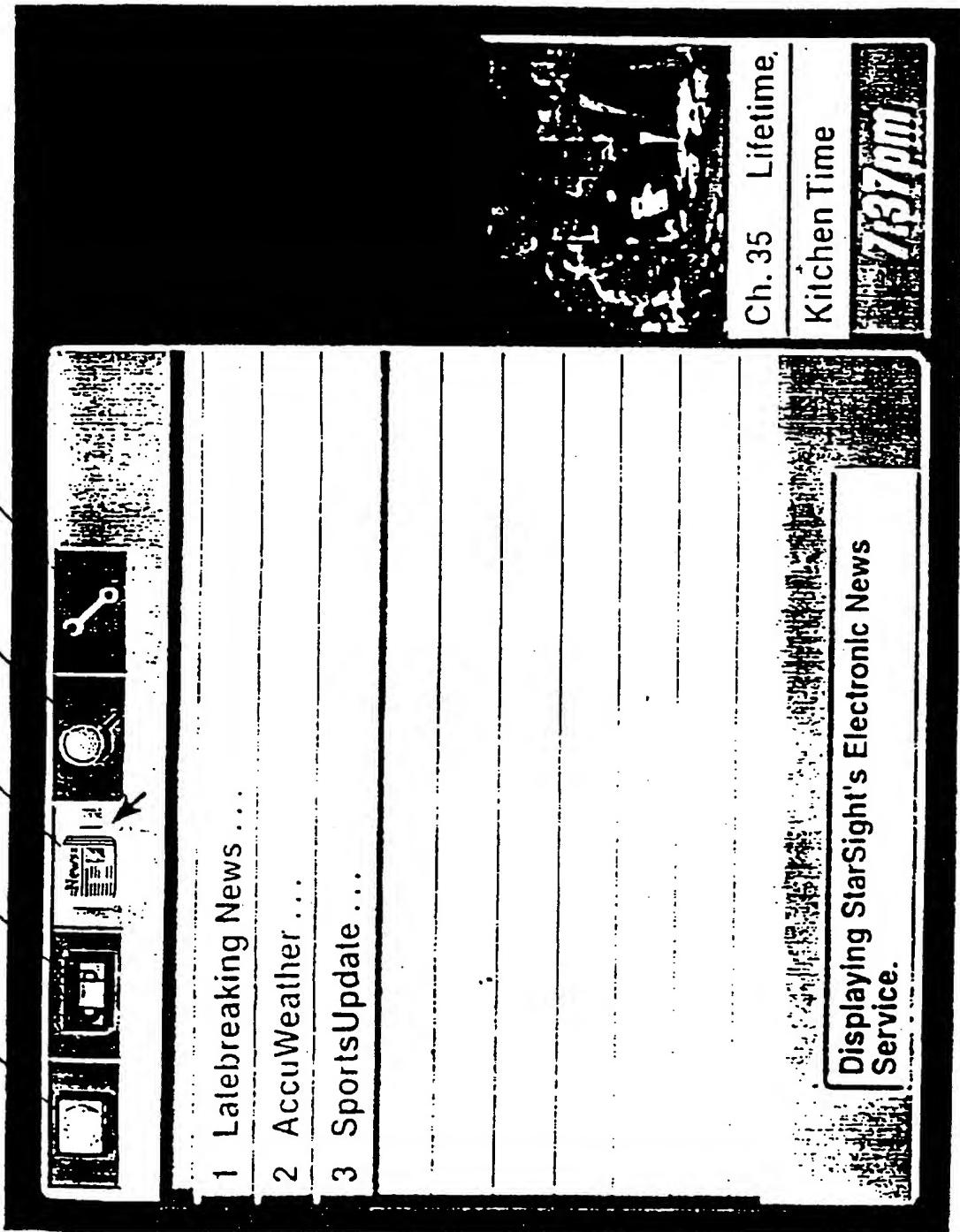
11 Electronic News Service / Program Guide Icon Highlight
 The user has moved the cursor up and off the display area and onto the display mode title area, and it has automatically become an area of selectable icons. The light blue around the Program Guide icon and the contextual help window at the bottom of the screen indicates that the Program Guide is the current display mode. The glowing light around the Program Guide icon reflects the fact that the cursor is currently over that area.

31/35



i2 Electronic News Service / Electronic News Service Icon Highlight
 The user has moved the cursor across the area of selectable icons and over the Electronic News Service icon, which automatically highlights (glows). The contextual help window at the bottom of the screen indicates that clicking on this icon will give the user access to News, Weather, and Sports.

Fig 29

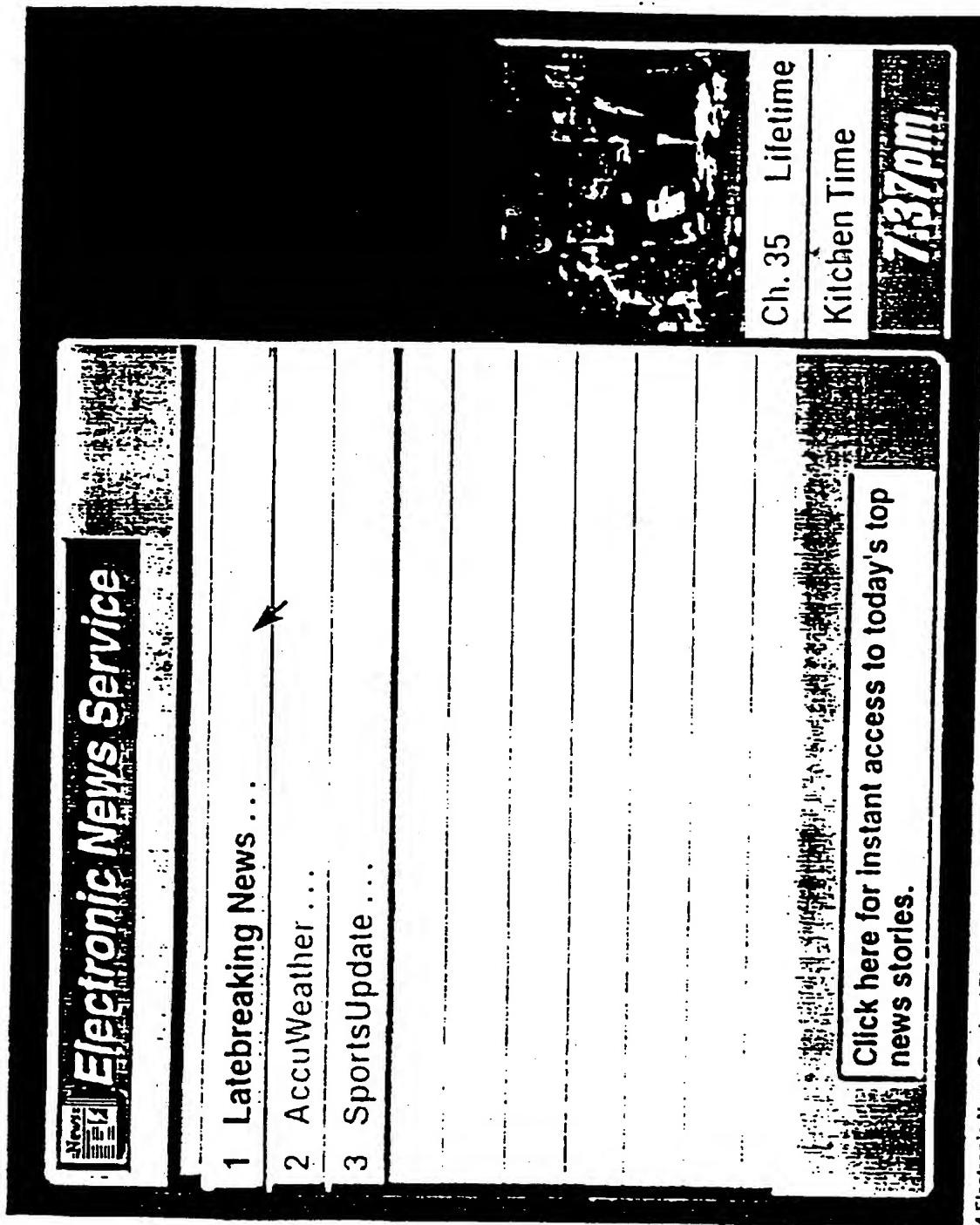


J3 Electronic News Service / Electronic News Service Icon Click
As soon as the user clicks on the Electronic News Service display mode icon, the transition animation occurs and changes the display area to the top level of categorical choices (shown here as Latebreaking News, AccuWeather, and SportsUpdate - however, it could be a wide range of similar services or these could be split into subcategories - i.e., WorldNews, NationalNews, and LocalNews, etc., and/or WorldWeather, NationalWeather, and LocalWeather, etc.). Note that the Electronic News Service display mode icon has the light

blue background color, indicating it is now the currently-selected display mode (while the cursor remains in this area of the screen). All other screen icons have disappeared, as they are not applicable at this point. The contextual help window indicates what is currently happening.

Fig. 30

33/35



- |4 Electronic News Service / Electronic News Service Item Click
 When the user moves the cursor down from the display mode icon area, it changes to display the Electronic News Service icon, along with the mode title. Because of the nature of this top-level set of choices, both item highlighting and item selection are coupled, so that the items are automatically selected as they're moved across. The only exception to this would be if there were websites or linked services associated with these categorical services themselves. In that case, highlighting would, as normal, consist of black text, with a single click

selecting the item so that the world icon and/or star icon could be accessed. The contextual help window prompts the user to click on the selected currently-selected item to access news stories

Fig 31

34/35

Electronic News Service

Latebreaking News . . .

1 G7 nations to meet at economic summit 

2 Clinton meets with European leaders

3 Saudis unveil new security plan

4 Second day of selection for Unabomber trial jurors

5 Hubble discovers earliest galaxies

6 Midwest drought worst in fifteen years

7 Nasa says shuttle crew resting after day of repairs

8 Jobless rate falls for third straight quarter

Ch. 35 Lifetime
Kitchen Time 

Click on this news headline to select it or double-click to read the full story.

[5] Electronic News Service / News Item Highlight

As soon as the user clicks on the "Latebreaking News" item, the display changes to a listing of news headlines. These news items can be double-clicked to open up to their full stories. At this point, the item is highlighted, but not selected. Clicking once on select the item would bring up any weblinks via the world icon or link services via the star icon if these links exist for that item. The parent item, "Latebreaking News . . ." is shown at the top, where it provides easy access back up to that level via a simple click. This display is scrollable in exactly the same

way as other scrolling lists, via the scrolling zones above and below the displayed items (in this example, the "G7 . . ." item is the topmost item, hence the scroll zone above it is inactive). The area below item 8 however, indicates that scrolling is possible beyond the 8 items shown in the display area.)

TUE 32

Electronic News Service

Latebreaking News . . .

1 G7 nations to meet at economic summit

► Leaders of the world's seven most powerful economies gathered over the weekend to begin this year's World Economic Summit. Among the issues expected to dominate the meetings were balance of trade with emerging Asian economies, and growing unrest in oil-producing regions. The summit, being held in Berlin, follows on the heels of the recent O.P.E.C. meeting, which resulted in substantial rises in the price of crude oil. European leaders have expressed concern

Ch. 35 Lifetime
Kitchen Time

Double-click on this news headline to display a listing of today's top news stories.



17 Electronic News Service / News Item Information

Just as in other parts of the StarSight AOS, the news items in the Electronic News Service's Latebreaking News can be expanded into scrollable info. And just as in other displays, this allows for scrolling vertically between single, informationally-related articles. Note that the info graph below the display area has changed to its recursive state, further reinforcing the connection between its use and double-clicking directly on an item to accomplish the same thing. The scrolling article functions exactly as scrolling texts elsewhere in the StarSight AOS.

Fig 33

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